NAVAL AVIATION SYSTEMS TEAM

1999 ANNUAL REPORT

THE YEAR IN REVIEW

Special thanks to all the contributors from across the Naval Aviation Systems Team. Your input and collaborative support made this publication possible.

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FRONT COVER:
SUPER HORNET ENGINEERING AND MANUFACTURING DEVELOPMENT SEA TRIALS ABOARD USS HARRY S. TRUMAN (CVN 75) (JUNE 1999)

BACK COVER:
F/A-18E PREPARING FOR CARRIER LAUNCH

Commander's Report

Vice Admiral John A. Lockard
Commander, NAVAIRSYSCOM

The 1999 Naval Aviation Systems Team (TEAM) Annual Report highlights the significant accomplishments and milestones achieved by our aviation program office and business unit personnel. We've added an executive summary this year to highlight some of our more noteworthy achievements, including the support members of our TEAM provided to our warfighting customers during Operation ALLIED FORCE in Kosovo and throughout continued operations in the Persian Gulf region. We've also included a section on "Improving Responsiveness to the Warfighter", in which we outline efforts to improve service and reduce costs. We hope to use future annual reports to showcase our progress as we continue our journey toward becoming a process-centered organization focused on delivering high-value results to the Warfighter.

As you will see in this report, the men and women of the TEAM continue to deliver the world's finest aviation equipment and systems to our operational forces. In 1999, our aircraft and missile systems were pressed into action on numerous occasions supporting national objectives worldwide. Our people and the weapons systems they produce performed extraordinarily well and supported many positive outcomes for our nation and our allies. I invite all members of our TEAM, including our industry partners, to take great pride in the level of service we have provided to our Warfighters. Your ever-present "can do" attitude is what our military personnel rely upon to perform their mission safely and effectively.

I hope you will find this report an informative, interesting, and useful reference in describing the many exciting programs and technological advancements underway throughout naval aviation. Please share this report with others who might have an interest in our unique mission and the many capabilities and services we provide on behalf of our Warfighters. I trust you will be impressed with the accomplishments of what I consider one of the finest teams of professionals in our Navy today.

Table of Contents

AVIATION ORDNANCEMEN CARRY AN AIM-7 SPARROW ABOARD USS CARL VINSON (CVN 70) OPERATING IN THE ARABIAN GULF REGION (MARCH 1999)

AN AIRCRAFT DIRECTOR USES SPECIAL FLASHLIGHTS TO COMMUNICATE WITH AIRCREWS AND FLIGHT DECK PERSONNEL ABOARD USS JOHN F. KENNEDY (CV 67) DEPLOYED IN THE MEDITERRANEAN SEA (OCTOBER 1999)

Executive Summary

The Naval Aviation Systems Team (TEAM) had a banner year supporting our Warfighters during 1999. We made great strides toward becoming a process-centered organization by reengineering our processes to better serve the Warfighter, and the returns are beginning to materialize. Many of our weapons programs passed important milestones during the year. Both the F/A-18E/F *Super Hornet* and the V-22 *Osprey* transitioned from developmental stages to operational evaluation. The AIM-9X *Sidewinder* achieved full integration into the F/A-18; and the first dual High Speed Anti-Radiation Missile (HARM) was launched from an F/A-18.

In addition to these accomplishments, the TEAM directly contributed to the success of Operation ALLIED FORCE in Kosovo and in continuing operations in Southwest Asia. Shortly after the first of the year, we received an urgent request from the Commander, Naval Air Force, U.S. Pacific Fleet for our Joint Standoff Weapons (JSOW) to be used by USS *Carl Vinson's* Air Wing in the Persian Gulf. In less than 10 days, JSOWs were transported from the U.S. to the Persian Gulf, and from there, weapons and support personnel from China Lake, CA, were transferred to USS *Carl Vinson*. Our people assisted aircrew and maintenance personnel with last minute updates to operational software. On 21 January, we announced that JSOW had achieved initial operating capability, and a few days later, JSOW was successfully used in combat. The lethal effectiveness of these weapons was reconfirmed only days after the Navy declared JSOW operational—a phenomenal effort.

In Kosovo, we supported Operation ALLIED FORCE by supplying our Marine Corps with the Advanced Tactical Aerial Reconnaissance System (ATARS). On 13 May 1999, the Chief of Naval Operations approved ATARS for early operational capability. A Marine F/A-18 squadron arrived in-theater on 24 May with two ATARS configured F/A-18 aircraft. Flight operations began on 28 May and continued through June in support of the North Atlantic Treaty Organization (NATO) objectives, attacking military targets

VFA-122 FLY-IN (NOVEMBER 1999)

throughout the former Yugoslavia. Summing up his glowing remarks, the squadron's commanding officer described ATARS as "indispensable to our Marines."

Our HARM and Joint Direct Attack Munitions (JDAM) performed equally well. U.S. Navy, Air Force, and allied aircraft fired more than 1,000 HARMs during the air campaign in Kosovo. A HARM Tiger Team from our Weapons Division deployed to Italy to support forward-deployed forces. The team tested more than 400 missiles in 36 days. Screening these assets saved approximately $238,000 in handling costs, but more importantly, it contributed to a safer environment for military aircrews. Other team members at China Lake, CA, directly supported fleet units in developing tactical solutions to defeat particularly complex enemy air defenses. Solutions were provided to Fleet HARM users in near real-time and resulted in confirmed hits. Notably, no aircraft were lost to enemy air defenses while HARMs were in flight. Weapons Division personnel also responded to make urgent changes to F/A-18 software in support of Marine squadrons deploying to the Balkans, and later briefed in-theater aircrew and maintenance personnel on the software changes. Early operational capability was approved for the F/A-18C/D to use the JDAM; and our forces operated with these missiles from land bases and from aboard USS *Kitty Hawk*.

British and U.S. forces fired more than 200 *Tomahawk* missiles in support of Operation ALLIED FORCE, including the 1,000th *Tomahawk* tactical firing, as well as the first *Tomahawks* fired by the United Kingdom.

In response to anticipated threats in the Kosovo region, our survivability division tested the ALE-50, a towed radio decoy designed for the F/A-18E/F, F-16, and B-1B aircraft. The division tested the decoy's effectiveness against threats on its land range. As a result of this test, the division issued a decoy performance update to all ALE-50 users operating in the Kosovo area, including the U.S. Air Force. *Aviation Week & Space Technology* (31 May 1999), citing Air Force officials, reported that 30 surface-to-air missiles had been fired at B-1 bombers over Yugoslavia. Of these, 10 actually locked on to the B-1s, and then were diverted to the decoy.

The TEAM also supported our allied customers, including an urgent requirement from the Netherlands for a P-3 chaff dispenser, associated software, and the required expendables. This requirement enabled the Netherlands to join forces with the U.S. in support of the Kosovo operation. Additionally, TEAM members provided a rapid response team to the Italian Navy in response to operational electronic warfare requirements. The success of this team allowed the Italian Navy AV-8Bs to subsequently fly multiple missions in support of allied Kosovo operations.

Our Weapons Division responded with priority range periods and target support in order to accelerate testing for the F-14B's upgraded global positioning satellite/inertial navigation systems operational flight program, resulting in early completion of the test program.

Team members at our Weapons Division also responded to an urgent training requirement from USS *Roosevelt*. An EA-6B squadron from Whidbey Island, WA, which had been unable to meet its training requirements before embarking aboard the *Roosevelt*, requested support from the Sea Range. The squadron flew a HARM exercise, complete with live firings and was therefore better prepared to attack targets when it deployed to the Adriatic Sea.

The Naval Aviation Depots also supported the Warfighters in Operation ALLIED FORCE by accelerating production and delivery of components to NATO and fleet customers. Fourteen members of the EA-6B Prowler team from the depot at Jacksonville, FL, spent the summer at Aviano Air Base, Italy, providing 24-hour troubleshooting, repair, engineering, and maintenance support to *Prowler* squadrons participating in NATO air strikes over Serbia and Kosovo. To ensure that the latest up-to-date threat information was available and to respond to around- the-clock requests from fleet users, the EA-6B Software Support Activity at Point Mugu, CA, provided rapid updates to the EA-6B's Electronic Warfare Database Support System. To support the high aircraft utilization rates, the Jacksonville depot surged production of J52 engines and components.

Our operational forces also called upon the Naval Air Technical Data and Engineering Service Command to provide technical assistance, on short notice, throughout the world. Technical representatives with the latest information were deployed with our Warfighters both at sea and at forward-deployed shore bases overseas.

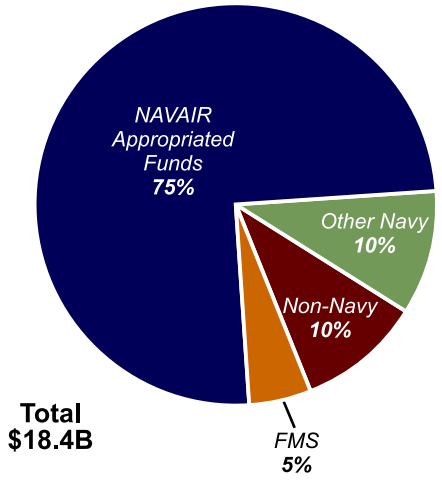
REENGINEERING OUR PROCESSES

In addition to these operational successes, we continued our Business Process Reengineering (BPR) efforts and made significant progress toward improving service and lowering costs for the Fleet. We are implementing more than 80 recommendations to improve the way we do business and are moving closer to becoming a process-centered organization, focused on our customers.

As we take the final steps in our process improvement journey, the TEAM is participating in the Navy's pilot efforts to demonstrate the use of off-the-shelf business operations software known as Enterprise

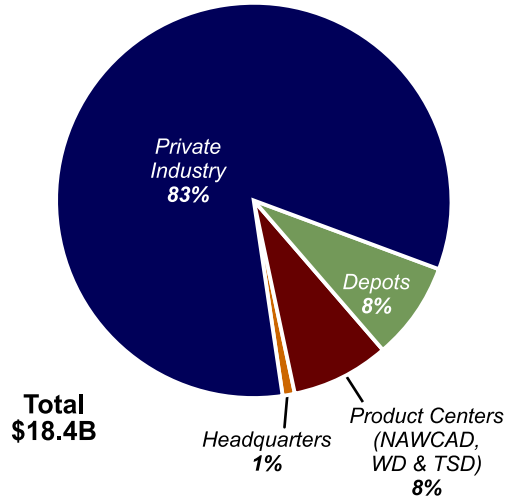
Where the Funding Comes From (Customers)

figure 1



Who Gets the Funding (Sources of Products and Services)

figure 2



Major Products and Services Delivered

figure 3

Aircraft	**87**
Missiles	**439**
Targets	**178**
NADEPs	
Aircraft SDLM	**378**
Engine Repairs	**1,576**
Component Repairs	**108,332**
NAPRA	
Aircraft SDLM	**26**
Component Repairs	**992**
Emergent In-Service Repairs	**504**
Contract Actions	**9,353**

Resource Planning (ERP). Through ERP, we expect to intensify our process improvements by automating and integrating many of our business processes and by sharing common data and practices across the TEAM. The ERP system will allow us to produce and provide access to information in a real-time environment.

In conjunction with our reengineering efforts, we remain committed to maintaining a dual focus on meeting both mission requirements and lowering total ownership costs for the Fleet. Teaming with fleet customers and other Navy components, our Aviation Maintenance Supply Readiness action team continues efforts in five principle areas: metrics, integrated logistics support, maintenance and supply, personnel, and funding and cost management. In 1999, we funded 136 affordable readiness initiatives and approved 90 initiatives for FY00. The FY99 initiatives amount to an investment of more than $80 million with a projected return of more than $844 million over 10 years.

The TEAM continues to focus on reducing the cost of doing business for the Navy. Of the $18.4 billion we received in 1999, 83 percent was funneled to private industry, resulting directly in products and services for our warfighting customers *(figures 1 & 2)*. We remain committed to reducing our costs wherever possible.

As we close the history book on 1999, we stand on the verge of a new century and look back at 88 years of naval aviation. We can be justifiably proud of our accomplishments. The major products and services delivered in 1999 are depicted in the table *(figure 3)*. The outstanding efforts of the men and women of the TEAM directly contributed to the success of Operation ALLIED FORCE and ongoing operations in Southwest Asia. The TEAM's accomplishments during 1999 exemplify the spirit of service and commitment to our warfighting customers that we are dedicated to continuing well into the next millennium.

ENGINEERING AND MANUFACTURING DEVELOPMENT SEA TRIALS -- USS HARRY S. TRUMAN (CVN 75) (MARCH 1999)

TOPSCENE MISSION REHEARSAL PROGRAM – NAVAIR PROVIDED FRONT-LINE SUPPORT TO ALL BRANCHES OF THE SERVICE DEPLOYED IN THE BALKAN REGION

TWO NEW SUPER HORNETS (FOREFRONT) PREPARE FOR DEPARTURE ABOARD USS HARRY S. TRUMAN (CVN 75), DURING SEA TRIALS, WHILE TWO HORNETS STAND BY ON THE ANGLED DECK (MARCH 99)

TEAM Profile

MISSION

The Naval Aviation Systems Team (TEAM), in partnership with industry, serves the nation and the Navy by developing, acquiring, and supporting naval aeronautical and related technology systems with which the operating forces, in support of the unified commanders and our allies, can train, fight, and win.

LEADERSHIP AND ORGANIZATIONAL STRUCTURE

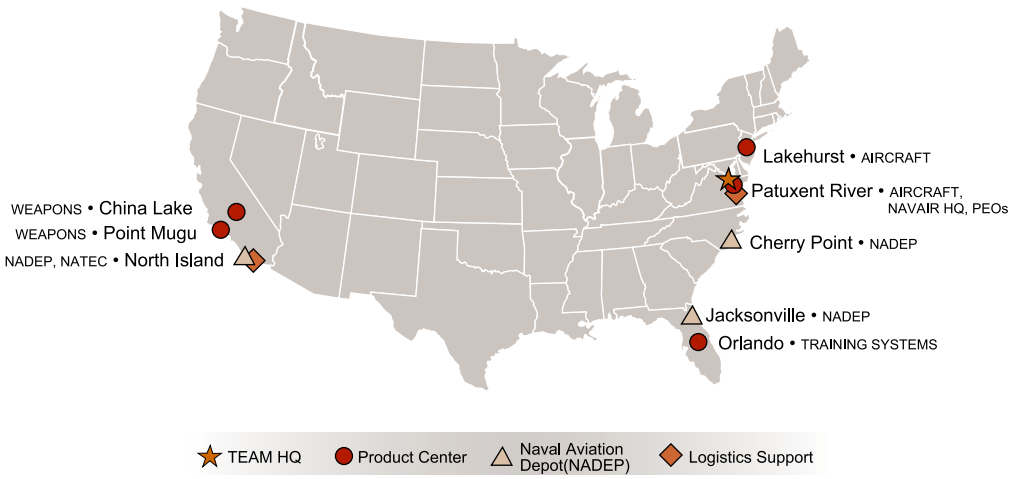
The TEAM is comprised of six organizations working together as a fully integrated team.

Naval Air Systems Command
Vice Admiral John A. Lockard, Commander
Rear Admiral Craig E. Steidle, Vice Commander
Dr. Allan R. Somoroff, Deputy Commander
Naval Inventory Control Point
Rear Admiral Michael E. Finley
Program Executive Office: Joint Strike Fighter
Major General Michael A. Hough (USMC)
Program Executive Office: Tactical Aircraft Programs
Rear Admiral Jeffrey A. Cook
Program Executive Office: Air Anti-Submarine Warfare, Assault, and Special Mission Programs
Rear Admiral Larry D. Newsome
Program Executive Office: Cruise Missiles and Joint Unmanned Aerial Vehicles
Rear Admiral Jack V. Chenevey

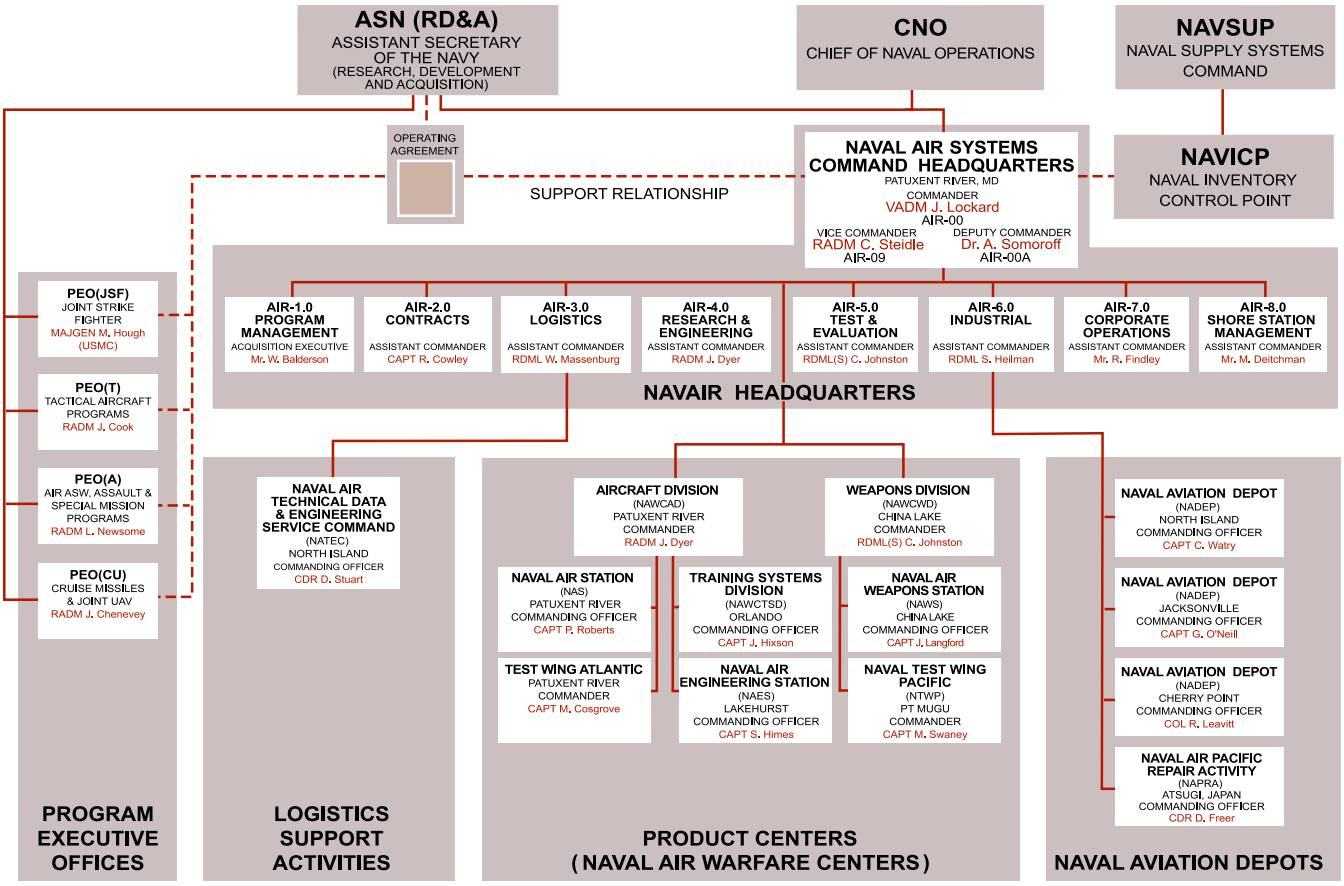
NAVAL RESERVE SUPPORT

In addition to our full-time active duty and civilian team members, more than 600 Naval Reservists bring a wealth of professional expertise to the TEAM. Led by Rear Admiral William E. Herron, U.S. Naval Reserve, members from the Reserve Air Systems Program contributed more than 64,000 man-hours across the major competencies and program management offices during 1999. Reservists assisted in numerous programs including the Joint Standoff Weapon System, the F/A-18E/F *Super Hornet* test and evaluation, and the unmanned air vehicle capability study.

NAVAL AVIATION SYSTEMS TEAM MAJOR SITES



Naval Aviation Systems Team Major Field Activities / Engineering Centers



PRODUCTS AND SERVICES

Together with industry, the Naval Aviation Systems Team (TEAM) delivers high quality, technologically superior and affordable products and support. Collectively, the TEAM is dedicated to pursuing business efficiency and achieving goals in support of the nation's defense.

Products and services include: aircraft, avionics, air-launched weapons, electronic warfare systems, cruise missiles, unmanned aerial vehicles, launch and arresting gear, training equipment and facilities, and all other equipment related to Navy and Marine Corps air power.

Total life support includes: research, design, development and engineering, acquisition, test and evaluation, training facilities and equipment, repair and modification, and in-service engineering and logistics support.

The TEAM is committed to supporting the Warfighter. Working as *One Team,* together we will continue to optimize our collective knowledge and capabilities to provide aviation solutions that support the Warfighter and ensure naval aviation superiority in the 21st century and beyond.

PERSONNEL

There are approximately 30,500 civilian and military personnel within the TEAM.

FACILITIES

The TEAM's facilities are located at eight major sites throughout the United States.

PROGRAMS

As of 1 October 1999, the TEAM managed 148 acquisition programs.

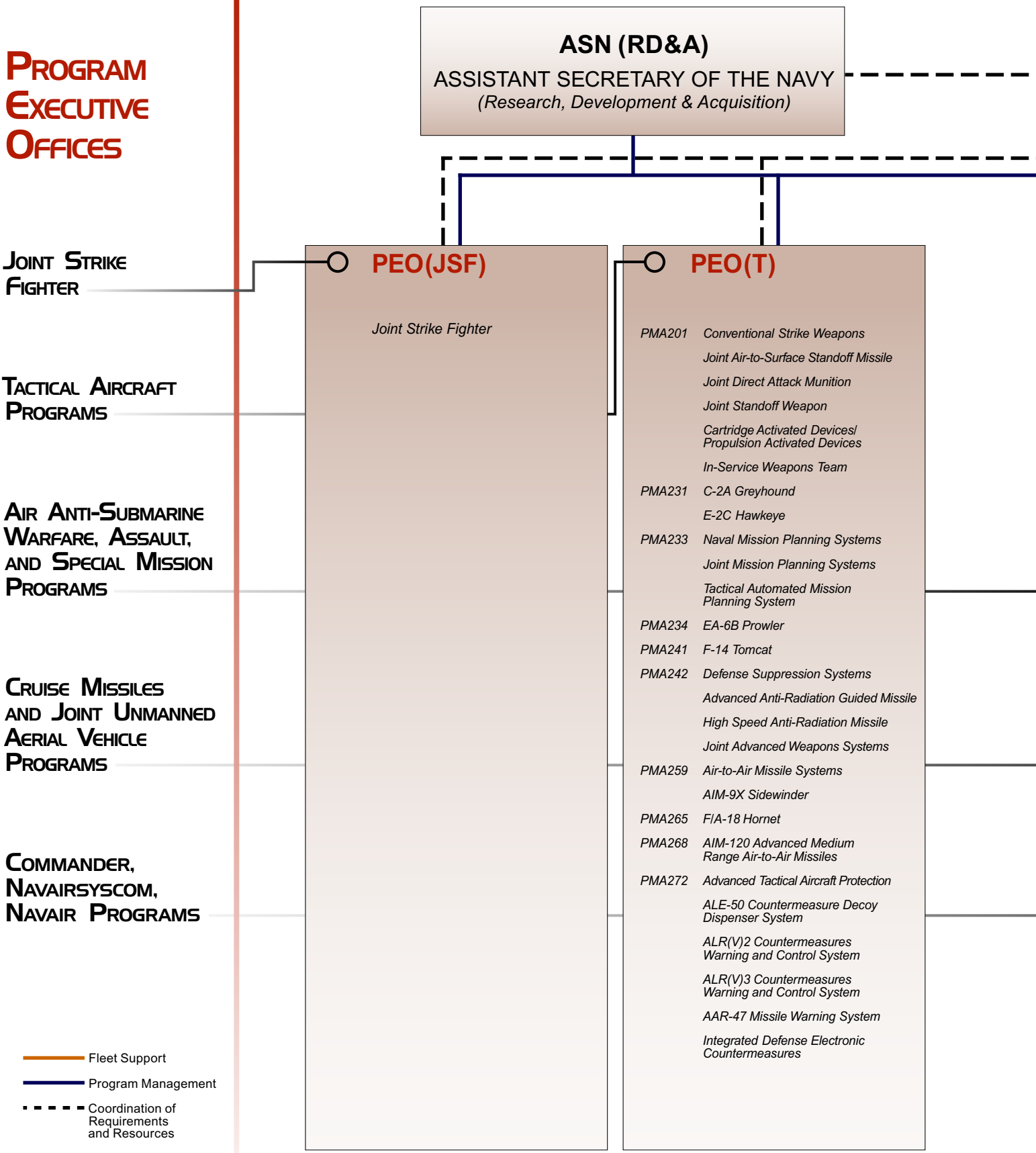
AIRCRAFT

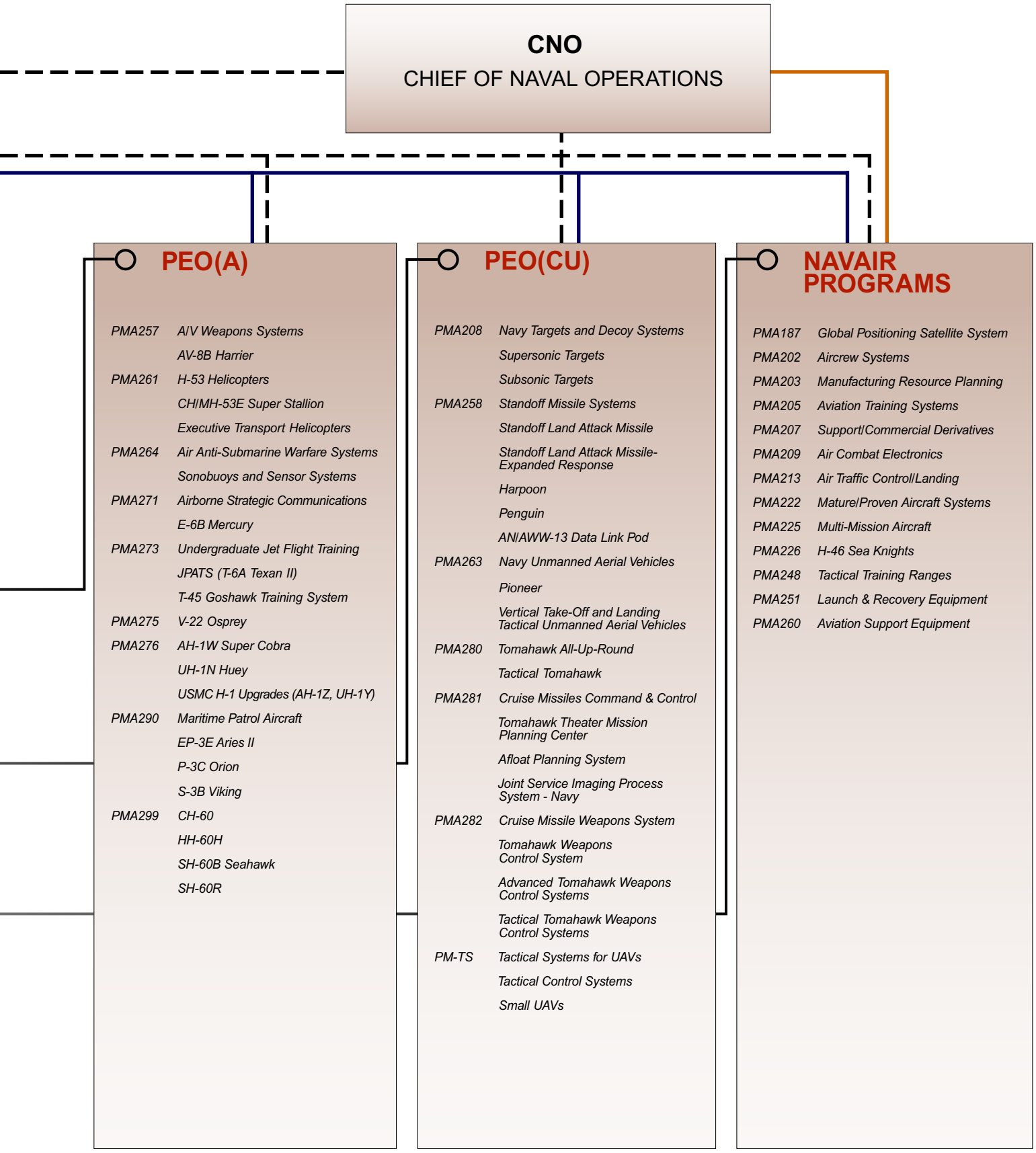
The Navy's total aircraft inventory is more than 4,100, including 103 individual type/model/series.

CUSTOMERS

The TEAM's principle customers include the U.S. Navy and Marine Corps operating forces, other Services, and our foreign allies.

Program Executive Offices




CNO
CHIEF OF NAVAL OPERATIONS
PEO(A)
PMA257 A/V Weapons Systems
AV-8B Harrier
PMA261 H-53 Helicopters
CH/MH-53E Super Stallion
Executive Transport Helicopters
PMA264 Air Anti-Submarine Warfare Systems
Sonobuoys and Sensor Systems
PMA271 Airborne Strategic Communications
E-6B Mercury
PMA273 Undergraduate Jet Flight Training
JPATS (T-6A Texan II)
T-45 Goshawk Training System
PMA275 V-22 Osprey
PMA276 AH-1W Super Cobra
UH-1N Huey
USMC H-1 Upgrades (AH-1Z, UH-1Y)
PMA290 Maritime Patrol Aircraft
EP-3E Aries II
P-3C Orion
S-3B Viking
PMA299 CH-60
HH-60H
SH-60B Seahawk
SH-60R
PEO(CU)
PMA208 Navy Targets and Decoy Systems
Supersonic Targets
Subsonic Targets
PMA258 Standoff Missile Systems
Standoff Land Attack Missile
Standoff Land Attack Missile-Expanded Response
Harpoon
Penguin
AN/AWW-13 Data Link Pod
PMA263 Navy Unmanned Aerial Vehicles
Pioneer
Vertical Take-Off and Landing Tactical Unmanned Aerial Vehicles
PMA280 Tomahawk All-Up-Round
Tactical Tomahawk
PMA281 Cruise Missiles Command & Control
Tomahawk Theater Mission Planning Center
Afloat Planning System
Joint Service Imaging Process System - Navy
PMA282 Cruise Missile Weapons System
Tomahawk Weapons Control System
Advanced Tomahawk Weapons Control Systems
Tactical Tomahawk Weapons Control Systems
PM-TS Tactical Systems for UAVs
Tactical Control Systems
Small UAVs
NAVAIR PROGRAMS
PMA187 Global Positioning Satellite System
PMA202 Aircrew Systems
PMA203 Manufacturing Resource Planning
PMA205 Aviation Training Systems
PMA207 Support/Commercial Derivatives
PMA209 Air Combat Electronics
PMA213 Air Traffic Control/Landing
PMA222 Mature/Proven Aircraft Systems
PMA225 Multi-Mission Aircraft
PMA226 H-46 Sea Knights
PMA248 Tactical Training Ranges
PMA251 Launch & Recovery Equipment
PMA260 Aviation Support Equipment

Capabilities and Services

RESEARCH, DEVELOPMENT, TEST AND EVALUATION

CAPABILITIES

The Naval Air Warfare Center (NAWC) hosts unique research and development laboratories and test facilities, serving the needs of the U.S. Navy, as well as other services, federal agencies, foreign customers, and commercial entities. The East Coast facilities focus on aircraft systems, while the West Coast sites concentrate on missile systems.

On the East Coast, the Patuxent River, MD, complex includes research and engineering disciplines of systems engineering, air vehicles, propulsion, avionics, crew systems, and test and evaluation. Facilities include unique research and development hardware and software facilities for the support of maritime surveillance aircraft, materials, air vehicles, aircrew systems, and avionics. Life cycle communications expertise for multiple platforms resides at the St. Inigoes, MD, annex. The NAWC's Lakehurst, NJ, site provides support equipment expertise and unique aircraft launch and recovery systems for the support of maritime aviation. NAWC's Orlando, FL, work force is responsible for integrated life cycle support involving research, front-end analysis, acquisition and product support for training systems, which span all naval warfare areas. The Key West, FL, detachment provides testing of developmental anti-submarine warfare hardware in the open ocean environment.

Unique aircraft facilities include: shore-based steam catapults and arresting gear; an automatic carrier landing systems facility; the Aircraft Combat Environment Test and Evaluation Facility (ACETEF), an integrated ground test facility for full-spectrum test and evaluation of aircraft and aircraft systems in a secure and controlled environment; a High Performance Computing Center to create high fidelity simulations; an electromagnetic environmental effects test and evaluation facilities; a dynamic in-flight radar cross section measurement facility; an electronic warfare flight test facility; an aircraft stores certification facility; a horizontal accelerator to simulate crashes; a vertical accelerator to simulate ejections; and propulsion system evaluation facilities for the testing of engine accessories.

The NAWC's Aircraft Systems Integration Laboratory (ASIL), the large anechoic chamber at Patuxent River, gives the added and unique capability to conduct radio frequency (RF) and system integration testing of large or multiple aircraft. The large anechoic chamber is a secure facility capable of replicating the RF combat environment anywhere in the world, while simultaneously evaluating multi-sensor information, systems fusion, and systems integration. Modular wall panels allow for quick facility reconfiguration. The use of ACETEF provides simulation/stimulation of any RF environment, including verifiable recreations of a realistic battle. This facility provides our engineers and scientists with the capability to ensure our Warfighters have "battle ready" integrated systems that are network centric. During 1999, the ASIL hosted its first full-scale Electromagnetic Environmental Effects (E^3) tests on an S-3B *Viking* aircraft modified with a new communication suite. Testing in the ASIL allowed cost efficient operation and testing of the S-3B Link-11 and satellite communication systems for extended periods of time.

Additionally, Patuxent River is home to the Naval Test Wing Atlantic, which is comprised of more than 130 Research, Development, Test, and Evaluation (RDT&E) aircraft with access to 50,000 square miles of air space in which to conduct flight test operations. The Test Wing includes the United States Naval Test Pilot School. During 1999, the school graduated 68 flight test personnel who moved into program offices, technical support teams, and project offices developing new systems in support of the Warfighter.

On the West Coast, the Point Mugu, CA, Sea Range covers 36,000 square miles (expandable to 125,000 miles for larger operations) and is overlain by restricted military air space. A Federal Aviation Authority- approved flight route connects this airspace with R-2508 to allow large, complex, air-land-sea test and training scenarios.

In addition to these test capabilities, laboratory, and range assets, the China Lake, CA, complex offers 1,700 square miles of restricted land and airspace. Surrounded by 20,000-square miles of airspace for R-2508 joint military use, the combined area allows unrestricted aircraft operations and experimentation with hazardous and classified materials. The West Coast RDT&E infrastructure alone is conservatively valued at more than $2 billion. Assets include the 67,500 square-foot Missile Engagement Simulation Arena (MESA), the Weapons Survivability Laboratory (WSL), and the Integrated Battlespace Arena (IBAR). The MESA allows full-size aircraft targets to interact in carefully choreographed encounters with actual missile fuze systems. The WSL's live-fire test capabilities are being expanded under a $6.5 million military construction project. The IBAR's nine inter-connected laboratories are used for analysis and simulation from subcomponent to theater level.

AN ES-3B VIKING IN ANECHOIC CHAMBER

SUPPORTING THE WARFIGHTER

In support of our primary warfighting customers in naval aviation, the Naval Air Warfare Center (NAWC) hosted several thousand tests on the Land Range, Sea Range, Electronic Combat Range, White Sands Range, and the sled tracks. Weapons systems support activities included software releases for the F/A-18A/B and C/D *Hornet* to improve navigation and weapons-delivery capabilities. Weapons-integration developmental testing for the F/A-18E/F *Super Hornet* was completed and operational testing began. Together, the capabilities and assets of the NAWC East and West Coast sites provide the Warfighter an incomparable force multiplier.

Interoperability in the battlespace of the future is a primary goal for naval aviation, and the NAWC plays a major role in supporting this integrated environment. The Joint Test and Training Capability Assessment project team successfully completed the first test of data communications between the Atlantic Test Range and the Aircraft Combat Environment Test and Evaluation Facility (ACETEF) using high level architecture protocols and the Air Interoperability Center fiber-optic link. ACETEF engineers submitted cost data and will team with the Integrated Battle Arena (IBAR) at China Lake in support of the Simulated and Integrated Linked Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance Capability (SILC2) Foundation Initiative 2010 proposal. The project objectives are: to develop High Level Architecture-compliant distributed test capability for support of Joint Strike Fighter and/or F/A-18E/F programs; evaluate the ability to perform mission-level test and evaluation; develop techniques for evaluating attack tactics for moving ground targets; perform risk reduction for business processes reengineering initiatives on network centric warfare; and use and evaluate Foundation Initiative 2010 products in network centric warfare.

Fleet Battle Experiment (FBE) Echo tested major concepts of *Joint Vision 2010* and examined the operational and tactical level of war in the 2005-2010 time frame with the theme "Network Centric Warfare in the Urban Littoral and Asymmetric Maritime Dominance." The NAWC provided system integration for FBE Echo, conducted precision sensor-to-shooter live-fire engagements, and supported

real-time targeting and global positioning satellite-jamming exercises.

Additionally, the NAWC supported fleet training through 31 weapons firing exercises on the Sea Range (121 missiles fired), 76 firings on the Land Range, and 504 missions on the Electronic Combat Range, and also supported 117 target and other threat-simulation missions.

TESTING AND DEVELOPMENT

Throughout 1999, the Naval Air Warfare Center (NAWC) oversaw significant developments in naval aviation research, development, test, and evaluation. The resulting accomplishments will provide our Warfighters with the best aircraft, weapons, aviation equipment, and support for years to come. The East and West Coast divisions have worked closely to provide smoothly integrated research, development, test, and evaluation of weapons and platforms. The F/A-18E/F *Super Hornet*, for example, after undergoing a rigorous flight-test program at Patuxent River, transitioned to China Lake. NAWC accomplishments for the *Super Hornet* included completion of the high angle of attack program, flutter program, performance and flying qualities demonstrations, anti-submarine aircraft carrier demonstration, loads, noise and vibration testing, follow-on sea trials, and envelope expansion for smart weapons. Approximately one-half million pounds of ordnance were released to test weapon separation/compatibility. Flight-testing included releases/live firings of a wide range of munitions, including High Speed Anti-Radiation Missiles (HARM), *Maverick* missiles, and air intercept missiles. NAWC personnel worked with the Board of Inspection and Survey and higher headquarters to resolve the status of deficiencies found on the aircraft during engineering and developmental testing. This coordination allowed for Operational Test Readiness Review recommendations to be accepted at the Navy level, supporting the certification of readiness for operational test and successful commencement of operational evaluation.

AN F/A-18 HORNET ASSIGNED TO STRIKE FIGHTER SQUADRON 151 (VFA-151), DEPLOYED WITH USS CONSTELLATION (CV 64), BREAKS THE SOUND BARRIER OVER THE PACIFIC OCEAN (JULY 1999)

The NAWC continued support of the Joint Strike Fighter (JSF) program with engineers and test pilots participating in contractor first flight readiness review planning and coordination. Significant facilities efforts are underway to ensure that the Patuxent River test site is fully ready to support FY00 concept development flight-test efforts. The NAWC supported extensive modeling and simulation work in support of the JSF requirements processes, as well as numerous technology maturation development efforts, including evaluation flights in variable stability research aircraft both in the U.S. and the United Kingdom to get an early look at JSF flying qualities.

The Aircraft Combat Environment Test and Evaluation Facility completed the first phase of support for V-22 operational evaluation testing. The test involved multi-spectral stimulation of V-22 avionics linked to the V-22 cockpit. Upgrades included high-fidelity visuals for low flying aircraft, incorporation of chaff/flare effectiveness data, and ultraviolet stimulation.

The F/A-18A-D program completed ground tests and navigation flights on the latest embedded global positioning satellite system/inertial navigational system software (95H-LEHU) and final evaluations of the Joint Paintless Aircraft Program (Appliqué). Appliqué tests were successfully completed with the Appliqué surface needing only minor repairs throughout the test period. An appreciable amount of F/A-18E/F comparison and risk mitigation testing was performed throughout the year with auxiliary power unit oil temperature ground tests conducted in the summer to aid with analysis of F/A-18E/F auxiliary power unit high oil temperature issues. Additional projects included installation of the Crash Survivable Flight Incident Recorder System on squadron aircraft and evaluations of the Joint Helmet-Mounted Cueing System and Tactical Aircraft Moving Map Capability. AIM-9X integration, loads environment, and initial separation flights were conducted with three successful separation shots completed. The F/A-18A-D program also conducted Multifunctional Information Distribution System/Positive Identification System cooperative testing with the NAWC's West Coast division in support of fleet exercises.

The NAWC oversaw numerous milestones passed for key missile systems. The Joint Standoff Weapon (JSOW) reached initial operational capability in January 1999. Since that time, more than 50 weapons

have been successfully used in combat. The Joint Direct Attack Munitions (JDAM) received approval for the second phase of low-rate initial production, and early operational deployment allowed the weapons to be used in Operation ALLIED FORCE.

The AIM-9X *Sidewinder,* the world's premier air-to-air combat missile, began live-fire developmental testing during the year. The Rolling Airframe Missile (RAM) successfully completed engineering manufacturing developmental and operational testing, successfully engaging diving, supersonic, maneuvering, and dual targets.

The NAWC established a Special Mission Integrated Product Team (IPT) for the EP-3. The IPT provides weapon system support for the aircraft and oversees modifications for the EP-3A joint airborne signal intelligence architecture.

Developmental testing of Open Systems Core Avionics Requirements (OSCAR) software for the AV-8B *Harrier* aircraft began. OSCAR uses commercial off-the-shelf technology to enhance the *Harrier's* ground-attack capabilities for the Marine Corps.

Two new operational flight programs for the EA-6B are increasing the *Prowler's* threat-radar coverage and HARM capabilities. NAWC engineers also completed developmental testing on new software for the AH-1W helicopter; the software will dramatically reduce cockpit workload for the *Cobra*. NAWC personnel also completed development testing on a software block upgrade for the F-14A/B *Tomcat* that enhances tactical weapons capabilities.

PARTNERSHIPS

To streamline operations and reduce costs, the Naval Air Warfare Center (NAWC) applied for the congressionally-authorized "Revitalizing Laboratories and Test and Evaluation Centers Pilot Program." Acceptance to this three-year program was announced in April 1999. The program, which allows a waiver of any restrictions not required by law, is being used by both East and West Coast sites to develop and expand innovative methods of partnering with industry and academia to provide more defense research for each dollar spent. For example, allowing for local signature authority for a particular class of commercial service agreements has reduced the time for approval from nine months to a few days.

The NAWC continued its close cooperation with other Department of Defense facilities, sharing resources for research, development, test, and evaluation, as well as ballistic missile defense and training and tactics development for air, land, and sea warfare. The NAWC is linking seven of its laboratories with the Atlantic and Pacific range facilities to create a simulation capability for testing in the complex battlespace of the future. In addition, the West Coast division is connecting to the Maritime Battle Center in Newport, RI, and the Training Systems Division in Orlando, FL. This expanded network of linked facilities will provide operational realism through a vast and diverse array of terrain and geographical features, aircraft and weapons hardware in-the-loop simulations, and software support activities—in effect a theater-level warfare laboratory. A memorandum of agreement with the office of the Secretary of Defense and other services established the Advanced Distributed Learning Co-Laboratory. The Co-Laboratory allows the Naval Air Systems Command to leverage advances made by all the services in the area of advanced distributed learning.

The NAWC hosted an exercise at Patuxent River, sponsored by the Defense Advanced Research Program Agency (DARPA) and the Office of Naval Research. The exercise was designed to verify algorithms and the radar systems' ability to collaborate target information from three airborne platforms to provide the most accurate strike reconnaissance and intelligence information. The Affordable Moving Surface Target Engagement program was conducted using the Atlantic Test Range facilities. These facilities afforded the capability to simultaneously track three test aircraft and six ground test vehicles, with real-time monitoring (geo-location, radio, video) by the DARPA test conductors in the range control room. Other facilities involved included Test Article Preparation, Air Operations, and the Naval Force Aircraft Test Squadron. Tracking systems used the global positioning satellite system with a data link for all ground test vehicles and one test aircraft. Data from all participants was time-synchronized for post-mission reconstruction and playback. The demonstration was a complete success, proving that moving ground vehicles could be successfully tracked with airborne synthetic aperture radar systems.

Developmental efforts on joint-service systems (i.e., JSOW and JDAM) were complemented by joint-service use of the West Coast ranges. Marine Corps, Air Force, and Army units all participated in the test events. Additionally, the Air Force funded an Ejection Tower Team to perform a design validation test program on the Lockheed Martin F-22 escape system. The Air Force needed sub-system level testing to demonstrate capability and evaluate the technical performance of personal protection and life support devices. This unique facility was instrumental in assessing program risk and proof of design before the Air Force committed to a low-rate initial production contract.

The Helicopter Transmission Test Facility tested a Coast Guard HH-60J main transmission input module to confirm the presence of an improperly cut bevel gear. The Navy has also encountered several input modules on SH-60 aircraft exhibiting the same phenomenon, which leads to excessive wear of the gear and its drive pinion, as well as the engine power turbine shaft. The test was conducted to develop a reliable method for the Coast Guard to identify the problem using field vibration monitoring equipment.

The NAWC's Advanced Distributed Learning-Surface Fleet Training office in Orlando, FL, serves as the Training Program Manager for the Navy's carrier of the future, the Aircraft Carrier Nuclear Experimental (CVNX), as well as the Amphibious Transport Dock (LPD-17) and the Surface Combatant for the 21st century (DD-21). Surface Fleet Training also developed a training plan to introduce "Smart Technology" throughout the surface Fleet.

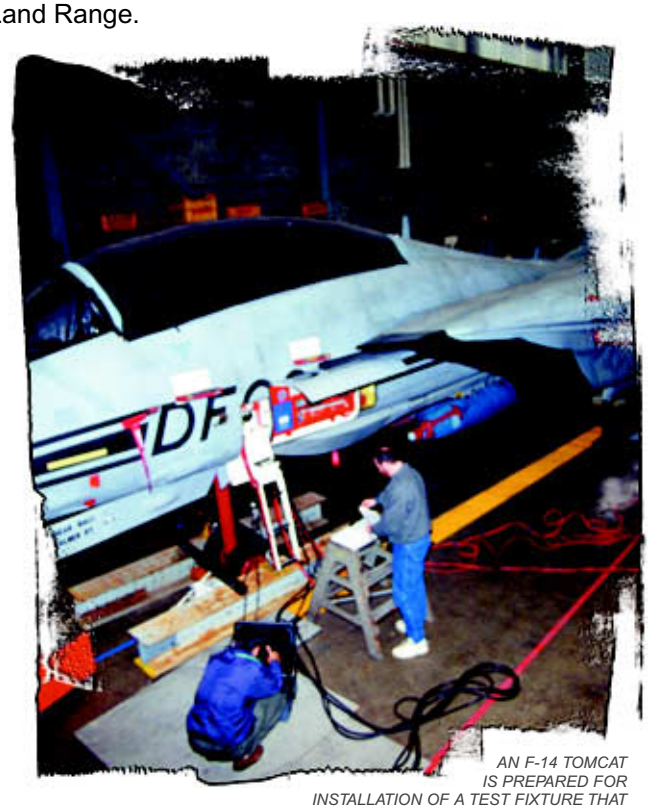
The NAWC Chief of Navy Education and Training, Chief of Naval Air Training, and Training Wing Four have established a micro-simulator lab at Training Air Wing Four to test the effectiveness, reliability, and use of low-cost commercial off-the-shelf gaming and micro-simulator software. The lab consists of eight workstations configured as T-34C aircraft and two configured as T-44 aircraft.

The NAWC's training systems specialists in Orlando, FL, are leveraging technologies developed for the Chief of Naval Education and Training to field instructional systems directly into Navy classrooms. The program includes 61 Automated Electronic Classrooms (AEC), eight Learning Resource Centers (LRC) and 13 Instructor Preparation Centers/Stations. The AECs and LRCs serve the Warfighter as automated curriculum delivery vehicles, which increase retention.

The E-2C Cooperative Engagement Capability (CEC) is a segment of the Ship Self-Defense System, providing all members of a CEC network with a real-time combined sensor picture of the air defense tactical environment. The CEC provides coordination and control of all involved air defense sensors and weapons in countering hostile threats to the Fleet. During 1999, the newly formed E-2C Integrated Test Team at FORCE Aircraft Test Squadron completed flying qualities testing of a new satellite communications rotodome antenna design and flight test for the new 15-ton vapor cycle cooling system. This system's software was modeled after the current F-22 cooling system. Integration of CEC into the E-2C provides the CEC program with the first fully functional airborne cooperating unit.

The NAWC partnered with industry on several levels, beginning with the range facilities themselves, which are operated by a government/contractor team. In the technology transfer arena during 1999, nine new cooperative research and development agreements were signed, bringing the total number of active agreements for the year to 48, including 19 with small businesses.

Teaming extended to the nation's allies. The Japan Self Defense Force made extensive use of the Sea Range for both test and training exercises, and the British flew against threat emitters and simulators at the Electronic Combat Range during Kosovo operations. Support for foreign military sales partners involved assistance to several foreign governments. Foreign military customers included the Japan Defense Agency that conducted SSM-1 missile firings and training exercises on the Sea Range. Other foreign customers were Australia, Canada, Finland, Germany, Israel, Kuwait, Malaysia, Norway, Spain, Switzerland, Taiwan, and the United Kingdom. Working with other Department of Defense services and foreign customers expanded the NAWC's network of partners and also helped to defray infrastructure costs, thereby reducing the overall cost to the NAWC's primary Navy customers. The Air Force utilized both the Sea and Land Ranges for weapons integration testing for their B-1, B-2, B-52, and F-16 aircraft programs. The Marine Corps conducted testing of the *Predator* shoulder-launched weapon on the Land Range.



AN F-14 TOMCAT IS PREPARED FOR INSTALLATION OF A TEST FIXTURE THAT WILL PROVIDE DATA TO EFFECTIVELY MAKE THE F-14 A MORE AGGRESSIVE MACHINE (PATUXENT RIVER NAVAL AIR STATION)

The West Coast division also tests standard missile variants and supports the National Aeronautics and Space Administration with launches of research rockets at the 3,200-square-mile White Sands Missile Range.

NAWC engineers on the West Coast completed the final design for an infrared sensor on the Standard Missile. The High Speed Anti-Radiation Missile (HARM) Block IIIA/V software completed developmental testing and began operational testing. The NAWC oversaw the first dual HARM launch from an F/A-18 on the Land Range and completed the second and third controlled test vehicle flights of the Evolved Missile. NAWC electronic warfare personnel began flight testing for the Integrated Defense Electronic Countermeasures radio frequency countermeasure risk-reduction program.

The NAWC's Year 2000 (Y2K) solutions teams from the West Coast traveled to 55 Navy installations throughout the world to assist in Y2K preparedness. The teams' approach was four-fold: test all mission-critical devices; inventory the infrastructure/facility computer systems; assess Y2K compliance; and recommend mitigation measures. Internally, the Y2K program office ensured a minimum of disruption to employees and customers through a comprehensive assessment and remediation program. Additionally, the operational test launch of a *Tomahawk* from a submarine on the Sea Range demonstrated the *Tomahawk's* Y2K compliance.

The NAWC continues its important mission, supporting our Warfighters through research, development, test, and evaluation. Their efforts will continue to ensure that our naval aviators have the finest, most advanced aircraft, weapons, and aviation systems available now and in the future.

NAVAL AVIATION DEPOTS

Total quality management within the Naval Aviation Depots (NADEPs) has been continuously refined and improved to ensure the highest quality. The Navy's depot infrastructure has been sized to core and is an efficient part of the overall inter-service and commercial industrial base. The three aviation repair facilities provide a full range of maintenance, engineering, and logistics support on all aircraft, engines, and components at a competitive price.

In 1999, NADEPs Cherry Point, NC; Jacksonville, FL; and North Island, CA; operated on the average of 85 percent capacity. In support of the Warfighter, the depots completed rework and repair on 264 aircraft, 817 engines, and 108,332 components. In addition, inter-service activities overhauled 42 aircraft and 319 engines; 72 aircraft and 440 engines were reworked commercially.

PROCESS IMPROVEMENTS

ISO 9002

Cherry Point achieved a significant milestone on 19 November 1999, when the facility was awarded the International Organization for Standardization (ISO) 9002 Registration. Cherry Point is the first Department of Defense industrial facility to achieve this distinction. The ISO 9002 registration culminated nearly two years of effort, during which time business operations were redefined, documented, implemented, and reviewed. ISO registration demonstrates a deep commitment to customer satisfaction; customers are assured they will receive the highest quality products resulting from the combination of quality workmanship and strict adherence to specifications and technical directives.

ISO 9000

The Jacksonville avionics integrated product team and supporting competencies have identified and documented processes, ensuring compliance with ISO standards. The team is nearly ready for the formal ISO 9000 auditing process that will document the depot's business operations. The effort will shift from identifying processes to actually carrying out those processes on the floor. This phase will involve the entire avionics work force. ISO 9000 certification indicates to our customers that the depot is serious about quality and lowering costs.

MANUFACTURING RESOURCE PLANNING II

During 1999, Jacksonville became the first Department of Defense site to "go live" with Manufacturing Resource Planning (MRPII), a reengineering tool that will drive improvements in scheduling, shop floor control, inventory management, and product delivery. As the depot transitioned to MRPII processes and used integrated data for decision making, it increased the amount of "process" thinking used to manage its business.

Cherry Point has taken aggressive measures to train its work force on MRPII. Data is being transferred from the depot's current systems into MRPII software to cut work orders. An auxiliary power unit was slated for induction in January of 2000 to verify the MRPII system.

BUSINESS PROCESS REENGINEERING

As a major step forward in reducing repair cost and cycle times, the depots have undertaken Business Process Reengineering (BPR) initiatives to improve component repair, material management, and planning and scheduling. BPR initiatives have resulted in

reducing depot material management costs by 30 percent, using competitive sources for packaging, warehousing, and receiving functions; reducing planning and scheduling costs by 25 percent while improving cycle time through the use of depot-specific customer focused profit/loss centers, production cells and flexible multi-skilled work teams; improving component dependability by altering the repair process, thus reducing the total life cost of each component; and incorporating earned value performance monitoring to improve process efficiency.

Jacksonville and the Naval Air Warfare Center Orlando division partnered to develop multi-media video bulletins that take fleet personnel through step-by-step repairs/modifications. This real-time imagery for inspections, repairs, and modifications is electronically disseminated by compact disc or accessed via the Internet.

Jacksonville's aircraft, engine, and component repair lines began using a hand-held mini-computer to perform examination and evaluation checks on incoming aircraft. Historically, the process was labor intensive; however, this new technology has streamlined the discrepancy gathering and recording process. Time-consuming transcriptions have been eliminated, and processing has been reduced from 30 days to a few hours.

NADEP JACKSONVILLE MANAGERS TRAINED ON THE IMPORTANCE OF ISO 9000 CERTIFICATION BY ISO 9000 IMPLEMENTATION DIRECTOR, DR. BRUCE LAVIOLETTE, PH.D. (MARCH 1999)

IN-SERVICE SUPPORT

North Island's F/A-18 Hornet production team and its maintenance, corrosion, and paint program serviced 90 aircraft—the best record ever. Despite challenges, the team was able to continue to drive down costs and turnaround time.

The S-3 Viking production team matched their record-breaking effort of 1998—producing 19 standard depot-level maintenance aircraft. The S-3 program came in under cost and within schedule.

The seven aircraft produced in 1999 by the C-2 Greyhound production team represent a major turnaround for the program and the best production effort in 10 years, despite challenges in material availability.

The E-2C Hawkeye production team met the tough production schedule (10 E-2Cs completed phased depot maintenance needed) to provide front line Warfighters with the electronic measures support to maintain security and capability. Fleet logistics shortfalls in engines and propellers, as well as delayed funding of critical super components required for depot maintenance, presented obstacles for the team.

The components workload hour base increased 85 percent from FY91 through FY99, yet the North Island components production team reduced average turnaround time for these aircraft and shipboard parts from 74 days in FY91 to 29 days in 1999. The LM2500 engine program exceeded its planned output, and did so at projected cost levels.

Warfighters in Operation ALLIED FORCE benefited from the surge capabilities at North Island. The Air Force Air Logistics Centers requested and received expedited support from the depot for many components destined for North Atlantic Treaty Organization (NATO) forces. Accelerated production and timely delivery of components ensured fleet customers enhanced combat capabilities and overall readiness.

The Jacksonville F/A-18 Hornet aircraft team provides in-service repair and modification for the Navy's fleet and reserve aircraft. The F/A-18 integrated maintenance concept began in the first quarter of FY00. Under this program, the aircraft will undergo depot-level maintenance at the customer's site.

The Jacksonville F-14 Tomcat product team made significant improvements to fleet readiness. The F-14s at Jacksonville receive multiple modifications in conjunction with standard depot-level maintenance and return to the Fleet as a more capable strike-fighter.

Jacksonville is the single source for standard depot-level maintenance of the F-14A/B/D *Tomcat*, as well as major structural level modifications designed to extend the service life of the F-14. Integrated modifications include: digital flight control system; global positioning satellite (GPS) system modifications; low-altitude navigation and targeting infrared for night installations; fast tactical imagery; night vision cockpits; and other modifications that make the F-14 the carrier-based strike aircraft of choice in today's Fleet.

The Depot installed an electronic flight information system in 38 EA-6B *Prowlers*. The system increases aircraft capabilities and takes advantage of planned upgrades, including the GPS system. Through a partnership with commercial industry, the Navy was able to save on research and development costs. Fourteen members of the EA-6B Prowler team spent the summer providing troubleshooting, repair, engineering, and maintenance support to *Prowler* squadrons operating in NATO air strikes over Serbia and Kosovo.

The Depot reengineered and manufactured EA-6B aircraft canopy side beams, alleviating a grave supply shortage for the Navy. Engineers used reverse engineering and a sample to redesign and produce a solid aluminum side beam. The new side beam not only helps keep EA-6B aircraft flying, but also lasts 20 percent longer and results in a $180,000 cost avoidance.

Jacksonville established an EA-6B re-wing capability, which involves splitting a donor aircraft apart and removing the center wing section. After the re-wing, the *Prowler* receives standard depot-level maintenance and returns to the Fleet. The re-wing effort was accomplished seven days ahead of schedule and well under competitive costs.

The Jacksonville depot also modified the P-3C *Orion* with counter drug upgrade equipment, enhancing the Navy's ability to seek drug runner aircraft and boats.

The H-60 Service Tour and Extension Program (STEP) and in-service repair workload transferred from Cherry Point to Jacksonville in March 1999. As a result, Jacksonville artisans will perform STEP repair on 13 H-60s. Jacksonville, Lockheed Martin and Sikorsky Aircraft will continue to partner in this program. The workload transfer will save approximately $1.5 million.

PARTNERSHIPS

Cherry Point was active in government/private industry partnerships. In January, the Defense Industrial Supply Center (DISC) recognized the depot for its participation in a government/private sector

CHICAGO STUDENTS PARTICIPATING IN "REACH FOR TOMORROW" (A PROGRAM FOR AT RISK STUDENTS) RECEIVE A BRIEFING ON F/A-18 HORNET CAPABILITIES FROM AIRCRAFT PLANNER AND ESTIMATOR JIM RUSSELL AT NADEP NORTH ISLAND (JULY 1999)

partnership–the Industrial Prime Vendor program. Through this partnership, a private sector company helps supply the Depot's industrial spare parts for the aircraft it repairs. The partnership was established with a contract between the DISC in Philadelphia, PA, and Raytheon E-Systems of Falls Church, VA.

In other partnering opportunities, the high velocity oxygen fuel spray system was implemented as part of a Department of Defense/private industry partnership to find a replacement for chromium. The hard chrome alternatives team study effort will make the depot compliant with the Environmental Protection Agency's ban on chromium use.

The F/A-18E/F program office, Boeing, and the three Naval Aviation Depots have baselined the F/A-18E/F Integrated Readiness Support Teaming (FIRST) concept. Established by these parties and supported by extensive analysis, FIRST has the potential to produce a formal partnership/teaming or work share arrangement that will reduce total life cycle program costs and benefit both the Navy and commercial sector.

North Island engaged with the community in business, environmental, and educational partnerships. The Depot is a member of 11 local chambers of commerce and works closely with business leaders to resolve issues of mutual concern and economic impact. As the largest aerospace employer in San Diego County, North Island's revenues and payroll are significant contributors to the region's economic health. The depot strives to be an environmentally-sensitive "good neighbor", with 1999 projects ranging from the installation of three-stage filtration systems on paint

areas (reducing chrome emissions) to replacing wipe solvents with more environmentally-friendly products.

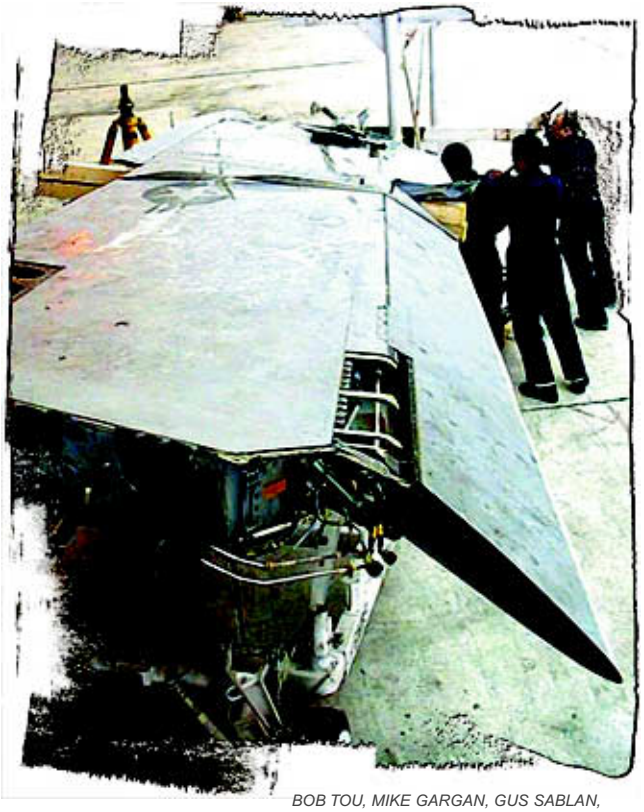
ISO 14001 CERTIFICATION

During 1999, North Island became the first Department of Defense organization to achieve International Organization for Standardization (ISO) 14001 registration—a set of worldwide environmental standards. The depot underwent a rigorous and extensive examination of its environmental management system and policies to achieve certification. Benefits of ISO 14001 registration include improved regulatory compliance and documentation, resource conservation, improved community relations, and employee awareness of environmental issues. The depot's environmental efforts also earned the Navy's Community Service Flagship Award for environmental stewardship in 1999.

NAVAL AIR PACIFIC REPAIR ACTIVITY

The U.S. Naval Air Pacific Repair Activity (NAPRA) in Atsugi, Japan, is the only forward-deployed member of the Naval Aviation Systems Team. NAPRA partners with industry and other U.S. Government agencies to provide high quality, responsive and cost effective depot-level maintenance in support of U.S. Navy and Marine Corps aircraft deployed to the Western Pacific, Indian Ocean, Mediterranean, and Arabian Sea theaters.

Headquartered in Atsugi, Japan (with field detachments in Okinawa, Japan; Naples, Italy; and foreign contractor facilities in Italy, Singapore, Korea, Australia and Japan), NAPRA blends its unique capabilities to deliver outstanding fleet-oriented, in-theater engineering and logistics support to the forward-deployed force. Repair activity services include Planner and Estimator (P&E) support (120 Aircraft Service Period Adjustment/Paint and Corrosion evaluation inspections and 535 aircraft damage evaluations in FY99), contract negotiation, and depot-level maintenance oversight. In FY99, NAPRA accomplished Standard Depot-Level Maintenance (SDLM) rework of 26 aircraft, while concurrently completing 504 emergent aircraft repairs, 175 customer service actions, 992 component repairs, and incorporating 124 aircraft modifications for more than 27 type/model/series of aircraft. Through aggressive program management, NAPRA reduced SDLM turnaround time for CH-53D/E helicopters by 6.5 percent and 12.1 percent for the KC-130F/R aircraft, and lowered unit costs by 19.1 percent and 10.9 percent, respectively. Mediterranean contractor teammates similarly reduced MH-53E SDLM turnaround time by 34 percent, and delivered at the lowest cost in the history of the contract.



BOB TOU, MIKE GARGAN, GUS SABLAN, AND MARC KLEIN FROM THE NAVAL AIR PACIFIC REPAIR FACILITY DISASSEMBLE THE WINGS, TAILS, AND HORIZONTAL STABILIZERS OF AN F/A-18 PRIOR TO TRANSPORTATION BACK TO THE UNITED STATES

In 1999, these efforts directly supported the combat air operations against Kosovo and the "no fly" zone patrols of Operation NORTHERN WATCH.

Depot artisans stationed at the NAPRA detachment in Okinawa perform depot-level structural in-service repair for all Navy and Marine Corps aircraft in the Western Pacific region. When the Fleet sends out a "911" request for P&E support, the detachment responds with personnel—usually within 48 hours.

In 1999, NAPRA's Okinawa customers included every aircraft carrier deployed to the Persian Gulf; U.S. Marine Corps aviation units deployed in Okinawa and Iwakuni, Japan; Carrier Air Wing Five aboard USS *Kitty Hawk*, forward-deployed to Atsugi; P-3 aircraft in Misawa and Okinawa, Japan, and Diego Garcia; and HC-5s on Guam. P&E and sheet metal mechanics are aboard each aircraft carrier deployed in the Persian Gulf. Machinists routinely travel to the ships to perform work needing their expertise.

NAVAL AIR TECHNICAL DATA AND ENGINEERING SERVICE COMMAND

On 1 October 1999, the Naval Air Technical Data and Engineering Service Command (NATEC) celebrated its first birthday in San Diego, CA. A combination of the former Naval Air Technical

Services Facility (NATSF) and Naval Aviation Engineering Service Unit (NAESU), the consolidated Command is naval aviation's preferred provider for world-class engineering technical services and technical data. NATEC consists of approximately 600 civil service, 700 contractor, and 80 military personnel located at 35 sites worldwide.

NATEC provides technical data services in the development, preparation, and distribution of aeronautical technical and maintenance management information. NATEC also exercises technical guidance over reproduction and distribution of systems for specified engineering design data. Hard work and commitment have improved overall processes and customer support, while continuing to exploit the use of leading-edge technology so vital in the information age.

As the Naval Air Systems Command's master repository for technical data, NATEC is driving digital conversion and distribution. To better meet the Warfighter's need for fast, up-to-date information, NATEC developed a web site that enables our fleet customers to electronically obtain the latest approved technical data. The web site, *http://www.natec.navy.mil*, currently provides technical manuals, interim rapid action changes, technical directives, technical publication deficiency reports, technical reports, and foreign military sales technical manual listings. It has not only dramatically shortened the time it takes to deliver accurate technical data to our warfighting customers, but has also lowered costs.

NATEC also provides Logistics Element Managers (LEMs) to NAVAIR programs for technical data guidance and support. The LEM's role is critical in the new digital data environment. By assisting program managers in procuring digital data, the LEMs help ensure the best solution for the system's intended life cycle use.

NATEC also plays a key role in the TEAM's affordable readiness program. The command provides field engineering technical advice, assistance, and instruction to naval aviation activities in the installation, maintenance, repair, and operation of all types of aviation systems and equipment to accomplish safe, affordable aircraft readiness. This encompasses active/reserve Navy and Marine Corps activities, as well as foreign military sales customers. Engineering technical services are an integral part of the Navy's training and maintenance continuum. With the average age of naval aircraft running about 17 years, NATEC's expert engineering technicians provide essential "corporate knowledge" gained through many years of operational experience to help keep fleet aircraft at top operational capability. Over 700 civilian, military, and contractor representatives provide on-site technical expertise for today's Warfighters.

In addition to the day-to-day technical services that NATEC supports at 35 worldwide locations ashore and afloat, NATEC provides off-site technical assistance wherever and whenever the Fleet needs it. In FY99, NATEC provided more than 1,100 off-site land-based and 250 at-sea "tech assists". More than 4,200 requests for technical assistance by fleet customers were successfully handled electronically. This saved both time and money and helped improve operational readiness of the aircraft and support systems. All assists were successfully completed to the customer's satisfaction. NATEC also provides feedback to logistics and engineering managers on product support, durability, and reliability. This first-hand fleet experience will prove invaluable, as NATEC becomes more integrated into fleet support teams in the coming year.

Lessons learned during Kosovo operations proved how essential alternative logistics support (such as access to up-to-date technical data and around-the-clock engineering technical services support) is in situations requiring mission-critical emergency maintenance and repair support. NATEC was called upon to provide technical assistance throughout the world, on short notice and often in harm's way. Technical representatives were deployed with our operational forces both at sea and at forward-deployed shore bases overseas. The expertise of these highly trained professionals has become more critical in today's climate of lean staffing and austere funding. NATEC continues to strive to be the first choice for technical data and engineering technical support for the 21st century.

NAVAL AIR TECHNICAL DATA AND ENGINEERING SERVICE COMMAND, NADEP NORTH ISLAND

NAVAL INVENTORY CONTROL POINT

Throughout 1999, the Naval Inventory Control Point (NAVICP) maximized warfighter readiness and met affordability challenges by teaming with industry and organic support partners to optimize supply chain performance. NAVICP emphasizes reducing costs and cycle times, while improving customer support and satisfaction.

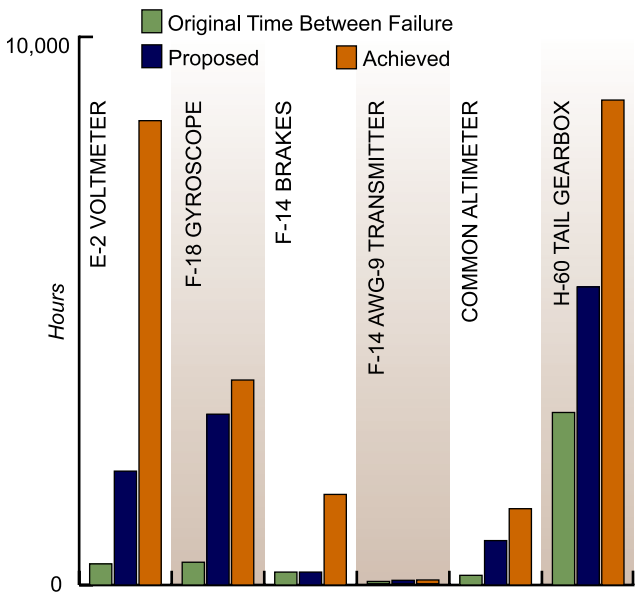
The NAVICP is transitioning from managing supplies to managing outcomes across the supply chain. The following examples illustrate NAVICP's approach to optimizing all aspects of the supply chain–repair, reliability, transportation, storage, and innovative contracting.

Retooling the organic repair scheduling process, in partnership with the Naval Aviation Depots, has helped NAVICP reduce repair turnaround times and drive down backorders 15 percent in FY99.

NAVICP continued its commitment to using Logistics Engineering Change Proposals (LECPs) to improve warfighter sustainability and lower the total cost of ownership through technology refreshment and reliability improvements. Fifteen completely installed LECPs resulted in a seven-fold increase in average mean-time-between-failure rates for the components. The LECP effort will generate $395 million in savings.

The premium transportation pilot was expanded to include 500 items weighing fewer than 150 pounds. These wholesale items are centrally stored in Memphis, TN, and delivered within 24 hours in the continental U.S., and in four days or less worldwide by a commercial carrier, which expedited delivery and achieved savings with no decrease in readiness.

NAVICP Engineering Change Proposal



Base Realignment and Closure actions reduced indoor storage capacity by 40 percent, resulting in more material being stored outdoors and unprotected. By purging excess stock, relocating slow movers, moving material indoors, and reinforcing container use, NAVICP is alleviating depot storage conditions that were having a negative impact on material condition and depot turnaround time.

The NAVICP is using innovative contracting techniques, such as Long Term Contracts (LTC) and Performance Based Logistics (PBL), to buy performance rather than just parts. Relationships are cultivated where industry makes reliability improvements, manages obsolescence, owns the inventory, and guarantees availability.

A five-year, $20 million LTC for main rotor and tail blades used on the SH-60 helicopter reduced cost approximately 20 percent and production lead-time from 21 to 12 months. These reductions are due to the "guaranteed minimum" feature inherent in the LTC relationship that allows the vendor to maintain a steady production line. As a result, the vendor has to incur set-up time and costs only once, and can order raw materials well in advance to minimize material lead-times and avoid material escalation costs. Similarly, a five-year, $70 million LTC to overhaul/upgrade CH-53 helicopter gearboxes reduced repair turnaround time from 300 to 60 days and eliminated backorders for the first time since 1982.

A six-year, $58 million procurement and repair PBL contract for the ALR-67(V)3 radar early warning receiver includes specific guarantees for reliability and availability (90 percent within five days) and provides for wholesale inventory management, surge capability, and program and engineering support, resulting in $29 million in savings. A 10-year PBL contract for an auxiliary power unit improves reliability from 30 to 60 percent and guarantees two-day delivery. This first-of-a-kind public/private partnership has touch labor provided by the Cherry Point Naval Aviation Depot, while program management, obsolescence management, product support engineering, and surge capability are provided by industry. This is a true win-win relationship for industry, the Naval Aviation Systems Team, and the Warfighter.

EA-6B PROWLER TEAM MEMBERS PROVIDE TROUBLESHOOTING, REPAIR, ENGINEERING AND MAINTENANCE SUPPORT TO PROWLER SQUADRONS PARTICIPATING IN NATO AIR STRIKES OVER SERBIA AND KOSOVO

NADEP CHERRY POINT EXAMINER AND EVALUATOR CHECKS THE FORWARD EQUIPMENT COMPARTMENT OF AN H-53

Naval Aviation Programs

PROGRAM EXECUTIVE OFFICE: JOINT STRIKE FIGHTER

The Joint Strike Fighter (JSF) program will develop and field an affordable, highly common line of next-generation strike aircraft for the U.S. Navy, Marine Corps, Air Force, and our allies. The carrier suitable variant of the JSF will provide the Navy a multi-role, stealthy strike fighter to complement the F/A-18E/F. The short take-off and vertical landing variant will be a multi-role strike fighter to replace the AV-8B and F/A-18A/C/D for the Marine Corps, and will replace the *Sea Harrier* for the United Kingdom's Royal Navy. The Air Force variant will be a multi-role fighter, primary air-to-ground, replacing the F-16 and A-10 and complementing the F-22.

The cornerstone of the JSF program is affordability—reducing the development, production, and life cycle cost of the JSF family of aircraft. The program was structured from the beginning to be a model of acquisition reform, with an emphasis on jointness, technology maturation and concept demonstrations, including early cost and performance trades integral to the weapon system requirements definition process.

In FY99, JSF continued its $2.2 billion competitive concept demonstration effort. The program's competing prime contractors successfully completed key reviews, continued fabrication and assembly of the concept demonstrator aircraft, and continued engine testing preparatory to flight testing in 2000. The third iteration of the joint initial requirements document, as well as a draft operational requirements document, was issued in support of the continuing requirements definition process. Critical technology demonstrations to lower risk and life cycle cost also continued. Italy, Singapore, Turkey, and Israel joined the program—the latter three under foreign military sales agreements.

The JSF program placed great emphasis on acquisition reform from its inception. JSF's "common family" of aircraft variants approach is estimated to save nearly $18 billion (FY95 dollars) in development. The services are evolving aircraft capability requirements incrementally, based on cost and operational performance trades in conjunction with extensive modeling and simulation. Warfighters and industry participate in this unique approach for establishing system requirements with an emphasis on affordability.

Technology maturation demonstrations focus on reducing total ownership cost and lowering the risk of leading edge technologies across the technical spectrum (i.e., airframe, flight systems, manufacturing and producibility, propulsion, supportability, and mission systems). Examples of specific technology maturation initiatives include: developing a system-of-systems strategy to maximize effectiveness and integration with other combat information systems; promoting innovative design and manufacturing approaches; improving tooling concepts and other process improvements; using paintless aircraft technology; and improving diagnostics and failure predictions to reduce the need for scheduled inspections and premature replacement of parts.

Streamlining acquisition processes is also central to the program. The program is making great strides toward a paperless office environment, including: contracting electronically (solicitations, source selection, and

award); monitoring contractor performance via direct government on-line access to real-time contractor data; and submitting electronic data deliverables and presentations. The engineering and manufacturing development contract will include performance-based specifications instead of the traditional military specifications. The result is that government will tell the contractor what performance is expected, rather than how to achieve it.

PROGRAM EXECUTIVE OFFICE: TACTICAL AIRCRAFT PROGRAMS

F/A-18 HORNET

In 1999, the F/A-18 program continued its many innovative efforts in naval aviation acquisition. The F/A-18E/F successfully concluded its engineering and manufacturing development phase. The program reached this milestone through the completion of the fatigue test article first lifetime, live fire testing qualification of the dry bay fire suppression system, and the completion of the engine full production qualification.

Twelve low-rate initial production aircraft were delivered, one aircraft ahead of schedule. The aircraft completed operational evaluation in November after undergoing nearly six months of flights and a complex variety of tactical missions representing the operational arena.

The Navy established its first F/A-18E/F squadron, Strike Fighter Squadron (VFA) 122, in January, as the fleet readiness squadron for the F/A-18E/F *Super Hornet*. The F/A-18 E/F Super Hornet program continues ahead of schedule, on cost, and more than 350 pounds below its weight specification. The F/A-18 E/F *Super Hornet* is expected to attain initial operational capability in late FY00.

The Foreign Military Sales (FMS) Integrated Product Team (IPT) successfully coordinated efforts among Naval Aviation Systems Team members and customers to improve capabilities and reduce costs. The Australian IPT received approval to cooperatively develop APG-73 electronic protection techniques with the U.S. Navy. Additionally, the Canadians, Australians, and U.S. Marine Corps will save approximately $5 million by sharing the cost of F/A-18A/B avionics upgrades.

Aircraft deliveries included 11 F/A-18A aircraft for the Spanish Air Force, refurbished by the North Island Naval Aviation Depot, under the Modification Corrosion and Point Program “Plus” program. The Swiss IPT delivered its 34th and final F/A-18 in December.

The F/A-18 fleet support IPT had many significant accomplishments in 1999. Fleet support coordinated activities that developed the Center Barrel Replacement Plus (CBR+) modification for the F/A-18A-D models. The team continued development of the F/A-18A reserve upgrade programs for the Navy and Marine Corps, coordinated the integrated F/A-18 requirement, modification, and maintenance program, and developed the F/A-18C/D production line shutdown and post-production support plan. The team began development of the F/A-18E/F integrated readiness support teaming concept for the life cycle of the *Super Hornet*. The team implemented resolution of numerous technical problems, including several landing gear issues and the full-life titanium hinge for trailing edge flaps and ailerons. Other IPT accomplishments include the delivery of 18 Lot 20 aircraft, a mission planning system, and the 13C(M) system configuration set. Planning and development for the standup of the Integrated Maintenance Concept (IMC) is complete and ready for final approval. IMC is scheduled to start in January 2000. This program is one of the key factors in maintaining the *Hornet* in the future.

JOINT STANDOFF WEAPON

The Joint Standoff Weapon (JSOW) is a joint Navy and Air Force program designed to increase standoff distance of the launching aircraft, reducing the risk from enemy forces. The JSOW consolidates weapon types by incorporating multiple systems into one weapon family.

In January 1999, the JSOW baseline variant (AGM-154A) achieved Initial Operating Capability (IOC). Since achieving IOC, more than 60 weapons have been expended in combat as part of Iraq

F/A-18F ENGINEERING AND MANUFACTURING DEVELOPMENT SEA TRIALS ABOARD USS HARRY S. TRUMAN (CVN 75) (MARCH 1999)

and Kosovo operations. The JSOW prime contractor, Raytheon Systems Company, completed delivery of 100 Low- Rate Initial Production-1 (LRIP-1) weapons and has delivered 146 LRIP-2 weapons. The JSOW completed integration and testing on the F-16 Block 50 and B-2 aircraft. Integration efforts continue on the F/A-18E/F, B-52, B-1, F-15E, and F-16 Block 40s. The first JSOW baseline missiles were delivered to the Air Force for the B-2 in November. In recognition of successful completion of 42 of 45 scheduled test firings, outstanding management of development and production, and early JSOW baseline combat employment, the JSOW program team received the Daedalian Weapons Systems Award.

The JSOW BLU-108 variant (AGM-154B) completed a series of developmental and operational live fire tests. Results far surpassed operational requirements by more than 300 percent. The Air Force JSOW test and integration team won the Air Armament Center's Engineering Team of the Year Award at Eglin Air Force Base. The Air Force conducted 40 flight tests on AGM-154As, AGM-154Bs, and BRU-57 Smart Rack during the year.

The JSOW Unitary variant, the AGM-154C, applied Cost As an Independent Variable (CAIV) principles and incorporated a lower cost seeker comprised of uncooled off-the-shelf detector technology and embedded seeker software to perform autonomous targeting acquisition. This CAIV weapon is capable against 95 percent of the required target set at approximately 60 percent of the pre-CAIV unit cost. The program is executing to a schedule that did not change the original pre-CAIV Milestone III decision date. In April 1999, the Under Secretary of Defense for Acquisition Technology and Logistics awarded the Unitary program the "Defense Acquisition Executive Certificate of Achievement" for implementing CAIV.

JOINT DIRECT ATTACK MUNITIONS

The Joint Direct Attack Munitions (JDAM) program is a joint Navy and Air Force program that provides low cost inertial navigation/global positioning satellite system guidance kits for 1,000 and 2,000-lb. conventional bombs. The kits enhance accuracy on a variety of aircraft, flying from medium-to-high altitude. During 1999, JDAM completed operational testing of the friction brake design.

The JDAM earned high praise and requests for more JDAM systems from the Warfighters during Operation ALLIED FORCE. The Air Force deployed more than 650 JDAMs from B-2s during Operation ALLIED FORCE, with 98 percent reliability, 96 percent effectiveness, and 87 percent of targets damaged or destroyed. Following the system's remarkable success, the program office began a JDAM product improvement program analysis of alternatives in November.

CATAPULT STEAM SURROUNDS AN AVIATION ORDNANCEMAN AS HE GIVES A THUMBS UP AFTER CHECKING THE JOINT DIRECT ATTACK MUNITIONS ATTACHED TO AN F/A-18C HORNET BEFORE LAUNCHING FROM USS KITTY HAWK (CV 63) (AUGUST 1999)

JOINT AIR-TO-SURFACE STANDOFF MISSILE

The Joint Air-to-Surface Standoff Missile (JASSM) provides a standoff missile to attack high-value fixed and re-locatable targets. The JASSM entered a 40-month Engineering and Manufacturing Development (EMD) phase in November 1998 under a contract signed with Lockheed Martin Integrated Systems. Officials extended EMD an additional 10 months due to late deliveries of sub-system components necessary to complete the EMD flight test vehicles.

The JASSM program completed three flight test events in 1999 using prototype missiles. The first test failed to meet all objectives when the wing and tail surfaces did not deploy following launch. The second and third tests met all objectives, including surface deployments and transition to controlled flight, engine start, powered flight and en route navigation along a 180-nautical mile route, and terminal maneuver, resulting in target impact. The warhead high explosive fill was qualified by the Naval Sea Systems Command as a Navy main charge explosive, and the warhead successfully completed all insensitive munitions tests. Program team members conducted ship installation assurance testing with the JASSM container on aircraft carriers USS *Washington* and USS *Lincoln* to ensure that the magazine areas have adequate space to handle and store missiles.

AIM-9X SIDEWINDER

The AIM-9X *Sidewinder* weapon system is a joint Navy and Air Force development program that will provide Warfighters with the premier "dogfight" air-to-air missile for the 21st century. The *Sidewinder* specifically addresses the joint requirement for an advanced short-range, air-to-air missile capable of defeating the widely exported AA-11 *Archer* and other foreign missiles. The AIM-9X weapon system is designed to replace the AIM-9M and is scheduled to be fielded on the Navy's F/A-18C/D *Hornet* and F/A-18E/F *Super Hornet* and the Air Force's F-15C/D *Eagle*, F-16/D *Fighting Falcon*, and F-22 *Raptor.* The AIM-9X is a major modification to the AIM-9M and incorporated many of the AIM-9M components (rocket motor, warhead, and active optical target detector) to help lower the overall system development and production costs. Technical features of the new missile include: full day/night capability; resistance to countermeasures; high off-boresight acquisition; and maneuverability/target acquisition superiority to any AIM-9 predecessor.

Raytheon Missile Systems and the Government are partners in an industry-led integrated process and product development team responsible for developing an effective and affordable weapon system. In 1999, the AIM-9X Sidewinder team completed the third year of a six-year engineering and manufacturing development program designed to achieve an initial operational capability in the year 2003. It is a cost as an independent variable flagship program, featuring an integrated program team approach and procurement price commitment curve.

The program accomplished several significant AIM-9X milestones during design, simulation, and testing. The first F/A-18 Separation Control Test Vehicle (SCTV) captive flight was successfully flown at China Lake, CA, on 18 March 1999. On 23 June, the first F-15 SCTV captive flight was successfully flown over White Sands Missile Range (WSMR), NM. The first guided launch of an AIM-9X Engineer Design Model (EDM) missile was successfully conducted on 30 June 1999 at China Lake. The EDM guided to a direct hit and kill (without a live warhead) of a QF-4S target drone. This guided firing was an uplook (blue sky), rear quartering shot (medium off-boresight angle) outside AIM-9M limits. The second AIM-9X guided firing (the first on an F-15 aircraft) was successfully conducted at WSMR on 1 September 1999, with a direct hit of the QF-4S target drone. This guided firing was a head-on, medium off-boresight angle, look-down shot. On 23 September, the program office certified the readiness of the AIM-9X to commence operational assessment in Navy F/A-18C/D and Air Force F-15C aircraft.

AVIATION ORDNANCEMAN ABOARD USS THEODORE ROOSEVELT (CVN 71) ARMS AN AIM-9 SIDEWINDER MISSILE PRIOR TO AIRCRAFT LAUNCH (JUNE 1999)

F-14 TOMCAT

The F-14 *Tomcat* is the Navy's long-range strike fighter aircraft. Modernization programs and technical and performance improvements ensure the *Tomcat* remains a viable threat to the enemy. The incorporation of *Tomcat* tactical targeting and the ability to generate and transmit targeting images and reliable coordinates make the F-14 a key participant in the emerging network centric warfare environment.

Tomcat improvements include the F-14B upgrade incorporating digital avionics, a major computer upgrade, and structural and survivability enhancements. During 1999, 13 upgraded aircraft entered service, bringing the total to 53. Currently, there are five F-14 squadrons deploying with upgraded aircraft.

The *Tomcat* is equipped with the Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) targeting system which provides accurate autonomous designation and targeting capability for the delivery of laser guided bombs. In 1999, 24 LANTIRN system kits were installed, bringing the number of LANTIRN ready F-14s to 169. In addition, 17 LANTIRN pods were delivered in 1999, bringing the fleet total to 47. Currently, all battle groups deploy with LANTIRN capable aircraft. Starting in FY01, LANTIRN systems will be upgraded with a 40K laser that will increase the aircraft's standoff capability and ultimately, its survivability.

In April 1999, the F-14 *Tomcat* deployed with fast tactical targeting, providing the Fleet with a day/night, standoff imagery transmission and reception capability. Fast tactical targeting is being used to transmit LANTIRN-generated Global Positioning Satellite (GPS) system quality coordinates with the target image to facilitate GPS guided weapon targeting. To date, 138 aircraft have been modified and 109 systems were delivered.

The F-14 is now incorporating the Joint Direct Attack Munitions (JDAM) interface to provide all F-14B and F-14D aircraft the capability to drop 2,000-lb. k84 JDAM variants in both preplanned and target-of-opportunity profiles. Initial operational capability for the F-14B is scheduled for June 2001, and the F-14D is scheduled for March 2002.

The *Tomcat* is the Navy's only manned tactical reconnaissance capability until the introduction of the next generation of reconnaissance aircraft. The Tactical Aerial Reconnaissance Pod System (TARPS) Digital Imaging (DI) system provides near real-time imagery for detection and identification of tactical targets, as well as immediate threat and bomb damage assessment. In 1999, TARPS DI deployed with all battle groups. TARPS greatly enhances the F-14 reconnaissance capability with relative single frame ground coverage and simultaneous view, record, and transmission functionality.

The incorporation of a Digital Flight Control System (DFCS) is a major safety enhancement to the F-14. This system replaces the analog flight control system and prevents departures from controlled flight and spins. To date, 100 aircraft have been modified including 57 F-14As, 21 F-14Bs, and 2 F-14D aircraft. Currently, six F-14 squadrons deploy with the DFCS capability. All F-14 modifications, including DFCS, were consolidated under the integrated modification program, resulting in considerable cost savings and reduced aircraft down time.

The F-14 has realized significant cost and schedule paybacks through the use of its integrated program management philosophy. This approach provides valuable insight into future resource requirements to support every aspect of the program, and facilitates the rapid and credible response to critical issues. The integrated program management toolkit includes the use of: earned value management at all F-14 field sites; an objective, consequence-driven risk management system; the resource allocation management process; and the comprehensive depot workload plan.

EA-6B PROWLER

The available EA-6B *Prowler* inventory increased from 82 to 99 aircraft and is on track to reach the goal of 104 by early 2000. The EA-6B program saw a reduction in aircraft depot cycle time and a decrease in out-of-service aircraft. This has allowed the Prowler team to change focus for 2000 from increasing inventory to improving readiness.

During 1999, three critical *Prowler* systems reached Initial Operational Capability (IOC). Universal exciter upgrade reached IOC in April with 127 of the planned 480 exciters delivered; and multi-mission advanced tactical terminal/improved data modem reached IOC in June. The equipment was already forward-deployed supporting Operations ALLIED FORCE and NORTHERN/SOUTHERN WATCH. Additionally, the band 9/10 transmitter achieved IOC in November. The first of 204 units was delivered in April 1999, four months ahead of schedule, on cost, and exceeding performance. Other notable events for the Prowler team included the fielding of the expanded mission mobile maintenance facilities at Prince Sultan Air Base, Saudi Arabia; Aviano Air Base, Italy; and Sembach, Germany. The program office also oversaw completion of Block 89A aircraft testing, leading to the Commander, Operational Test and Evaluation Force recommending fleet introduction. The Prowler team also began an analysis to augment and eventually replace the EA-6B.

E-2C HAWKEYE

The E-2C *Hawkeye* is an airborne early warning and control aircraft in service with the U.S. Navy and the air forces of several foreign governments. As the "eyes of the Fleet", the *Hawkeye* provides air and surface surveillance, intercept control, strike control, tanker coordination, search and rescue support, and drug interdiction assistance.

During 1999, the E-2C program continued its commitment to the Fleet and its foreign customers, providing outstanding support to existing aircraft configurations, as well as further enhancing the capabilities of this multi-mission platform. Program managers oversaw delivery of five Group II aircraft with navigation upgrades to the Fleet, moving one squadron closer to a total Group II and *Hawkeye* 2000 fleet. The Navy signed the E-2C multi-year production contract for 21 new aircraft in the *Hawkeye* 2000 configuration for a total cost of $1.183 billion and projected savings of $200 million. These aircraft,

EA-6B PROWLER FROM TACTICAL ELECTRONICS WARFARE SQUADRON 130 (VAQ-130) LAUNCHES FROM THE FLIGHT DECK OF USS ENTERPRISE (CVN 65) IN SUPPORT OF OPERATION SOUTHERN WATCH (APRIL 1999)

equipped with commercial off-the-shelf based mission computer and displays, satellite communications, and Cooperative Engagement Capability (CEC), are a large step toward fulfilling the vision of network centric warfare. The *Hawkeye* 2000 test bed participated in several tests supporting the CEC program, including a successful operational assessment in November. Additionally, the Fleet received five aircraft in a partial *Hawkeye* 2000 configuration in preparation for the mission computer operational evaluation slated for late 2000.

The advanced development IPT achieved a number of milestones. The IPT conducted a highly successful test of the radar modernization program installed on a mountaintop site at the Pacific Missile Range Facility in California. The test met all of the thresholds and virtually all of the objectives, while successfully demonstrating the integration of several new technologies that provide an evolutionary path for the E-2C sensor suite. The IPT also took delivery of the first prototype of an infrared theater ballistic missile detection and tracking system and custody of its newest test aircraft, the EC-130V, which will serve as the workhorse for the development of advanced technologies for the E-2C program. These programs will be the cornerstones of the E-2C's role as a critical node in network centric warfare.

The E-2C Foreign Military Sales (FMS) program saw almost $400 million in new business among its five current customers during the year. Four of the five countries began efforts to upgrade or buy new *Hawkeyes*, bringing their aircraft into a common configuration with the U.S. Navy. France, the newest member of the E-2C FMS team, performed carrier qualifications of their aircraft aboard the French aircraft carrier, *Charles de Gaulle*.

C-2A GREYHOUND

The *Greyhound* provides carrier onboard delivery of essential personnel and critical parts support for the Navy's deployed Carrier Battle Groups (CVBGs). Additional capabilities include air drop and mobilization support for special operations forces. As a critical battle group logistics asset, the C-2A will remain in service, performing a vital logistics support role to CVBG operational readiness through 2015 and beyond. Sustaining worldwide operational readiness will be possible through the Service Life Extension Program (SLEP) and ongoing cost reduction efforts. The SLEP includes upgrading the navigation and communication systems, complete aircraft rewiring, and structural enhancements based on the recently completed C-2A Full Scale Fatigue Test (FSFT). After three years of testing, the FSFT successfully completed 30,000 equivalent flight hours in June 1999. This test supports a service life extension to 15,000

AVIATION BOATSWAIN'S MATE CLEARS AN E-2C HAWKEYE ABOARD USS JOHN F. KENNEDY (CV 67) IN SUPPORT OF OPERATION SOUTHERN WATCH (NOVEMBER 1999)

flight hours and 36,000 landings. Currently, a complete tear down of the test article is being accomplished to support the findings identified by the "quick look" inspection completed in October, and to refine the necessary structural enhancements.

Additionally, program managers oversaw the Carrier Aircraft Inertial Navigation System (CAINS II) verification installation and ordered software fixes to the navigation system interface unit necessary to successfully complete operational testing. With the completion of operational testing, fielding of the CAINS II Navigation upgrade will begin in February 2000.

NAVAL MISSION PLANNING SYSTEM

The Naval Mission Planning System (NavMPS) program office continues to maintain its focus on the Warfighter. NavMPS fully supports maintaining a systems and network centric perspective.

NavMPS has been working with the Office of the Chief of Naval Operations, the Office of Naval Research, the Space and Naval Warfare Systems Command, the Naval Strike Air Warfare Center, and Carrier Group-Six to rapidly prototype a real-time decision support system. Using the "build a little, test a little" approach, the real-time execution decision system is tying the current tactical picture from Link-16, Link-4, and other data sources into mission planning.

The NavMPS program team accomplished a notable fleet-wide Y2K compliant upgrade of all tactical aviation mission planning system hardware and software suites for Navy/Marine Corps deployable carriers and airwing squadrons. This accomplishment, coupled with the initiative to integrate technical support personnel into the deploying activities, has brought the team into closer proximity and is creating a positive

working relationship with our Warfighter customers. Fleet aviators have embraced the Navy-portable flight planning system as the planning tool of choice. Achievements for 1999 included procurement and distribution of laptop computers, development of enhanced tools for the helicopter community, and development and release of Flight Performance Models (FPMs) to bring automated mission planning to the Warfighter. The program office configured and distributed more than 300 mission planning systems to fleet squadrons and training centers, and procured 650 additional portable workstations. The office completed, certified, and distributed FPMs for the AH-1W, CH-46E, E-2C+, F-14B/D, F/A-18E/F, HH-60H, SH-60F, and UH-1N aircraft.

The Joint Mission Planning System (JMPS), a co-development effort between the Navy and Air Force, awarded the JMPS Version One development contract to Logicon. The basic goal of the JMPS program is to provide an intuitive, easy to use Windows™ based system that meets the mission planning needs of all Warfighter communities in a single, scalable, collaborative system. The program office also delivered Version 2.0 of the F/A-18A/B-C/D automated tactical manual supplement program to fleet customers in March 1999. ATACS 2.0 satisfied fleet requests for a Windows™ compatible version of the program and the incorporation of joint standoff weapons planning.

The NavMPS program team developed the Paveway Munitions Planning Tool (PMPT) during 1999 to assist the Navy Stores Planning and Weaponeering (NSPW) team in obtaining fleet feedback regarding laser guided weapons planning. The PMPT was so well received by aircrew during demonstrations that efforts are currently underway to enhance the program for early 2000 release as an interim planning tool.

AIM-120 AMRAAM

Since achieving fleet initial operational capability in 1993, the AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM) has given F/A-18 pilots increased lethality and survivability. The Air-to-Air Joint Systems Program Office (JSPO) and Raytheon Systems Company, the prime contractor, have continually improved the AMRAAM, delivering more than 10,000 missiles to the Air Force, Navy, and foreign customers. During FY99, Raytheon deliveries to the Navy incorporated the latest active radar guidance updates and electronic protection measures developed in the Pre-Planned Product Improvement (P3I) Phase II program. In addition, the program introduced the AIM-120C-4/5 variants that improve lethality via a new warhead and enhanced kinematics with a new +5” rocket motor upgrade. The AMRAAM program continues to be a leader

ORDNANCEMEN ON USS THEODORE ROOSEVELT (CVN 71) TOTE A CART LOADED WITH AIM-120 ADVANCED MEDIUM RANGE AIR-TO-AIR MISSILES

in acquisition reform. In FY99, the Air-to-Air JSPO exercised the second option on the long-term pricing agreement sole-source contract with Raytheon. It incorporates performance specifications, contractor configuration control, total system performance responsibility, and contractor performance of many previously governmental support/test functions. In the Navy alone, these and other infrastructure reforms will generate approximately $93 million in FY00-05 projected program savings. A significant milestone at the beginning of FY99 was the award of the P3I Phase III contract that will provide enhanced performance in a next generation AMRAAM. The program office planned and executed the Phase III contract using the latest in acquisition reform initiatives, to include full teaming with Raytheon.

Performance of the AIM-120 in the Fleet continues to exceed performance, reliability, and availability thresholds. Affordable readiness initiatives approved and implemented this year will continue to improve AMRAAM’s operational effectiveness and suitability. With the approval of afloat reprogramming by the Weapons System Explosives Safety Review Board in September 1999, technicians completed the installation of power outlets for tactical software reprogramming on four of 12 carriers. All carriers are scheduled for completion in FY00. Using this new capability, all AIM-120C missiles and several hundred AIM-120B missiles have received a software upgrade with more planned for FY00. A service life prediction program for inventory surveillance versus scheduled maintenance has been implemented to identify potential service life drivers. A direct ship-to-contractor depot repair process was implemented via a long-term sustainment contract. These initiatives will save time, money, and ensure maximum availability to the Fleet. With strong planning and budget support in place, the AMRAAM will continually evolve, countering emerging threats for many years to come.

HIGH SPEED ANTI-RADIATION MISSILE

The High Speed Anti-Radiation Missile (HARM) continues to be a proven precision weapon against continuously emitting threat radar and moving land and sea threats. The HARM Block IIIA/V software upgrades will make HARM an even more formidable weapon. These software upgrades provide greater effectiveness against today's more capable anti-aircraft defense systems. Combined developmental and operational testing was completed in 1999. Operational testing included a total of three Block IIIA firings and five Block V firings from F-16s, F/A-18s, and EA-6B aircraft. In addition to providing greater aircraft protection against improved radar threats, the upgraded software improves anti-fratricide capability to minimize collateral damage and corrects a mechanical wear concern in the guidance section. Re-programming tactical missiles with Block IIIA/V software will begin in early 2000 upon receipt of the final operational test report from the Commander, Operational Test and Evaluation Force.

The re-programming will be done in conjunction with a joint Navy and Air Force stockpile reliability program, the goal of which is to develop a common reliability baseline of missile inventory populations. By sharing logistical data between services and eliminating expensive and unnecessary maintenance, the program will confidently predict inventory reliability and generate approximately $10 million in cost savings.

ADVANCED ANTI-RADIATION GUIDED MISSILE

An intriguing counter shutdown capability is currently being demonstrated on the High Speed Anti-Radiation Missile (HARM). The Advanced Anti-Radiation Guided Missile (AARGM) project is a small business innovative research technology that demonstrates radio frequency homing integration with an active millimeter wave terminal seeker.

This year, the team performed risk reduction activities in support of ground hardware tests and preparations for future flight tests. Activities included anti-radiation homing antenna array performance, affordability and producibility enhancements; millimeter wave radar transceiver and affordability enhancements; electromagnetic interference enhancements, radome material trade studies, and the development and validation of an advanced target discrimination algorithm. The program realized significant success in hardware production as technicians mounted the first AARGM seeker in a van and transported it to the Naval Air Warfare Center Aircraft Division at China Lake, CA, earlier this year. The seeker was then placed atop a test site on Black Mountain. Field-testing will be conducted on the initial captive flight unit at China Lake's Echo and Western Test Ranges in FY00. Success in testing will determine if, when, and on which weapons the technology will field. Fielding of this capability could be as early as 2007.

INTERNATIONAL HARM UPGRADE PROGRAM

The International High Speed Anti-Radiation Missile (HARM) Upgrade Program (IHUP) (AGM 88D Block 6 is the U.S. designation) is an international cooperative software and hardware upgrade. It will incorporate a current state-of-the-art global positioning satellite system/inertial measurement unit in place of original mechanical gyros to improve missile precision, increase probability of kill, and further reduce the probability of fratricide. As a by-product, the missile will have a high speed, point-to-point capability. Engineering manufacturing development contracts have been awarded to Raytheon at Lewisville, TX; Bodenseewerk Geratetechnik GmbH at Uberlingen, Germany; and Alenia Difesa in Rome, Italy. Raytheon successfully held the system requirement review in May 1999. The German Ministry of Defense in Koblenz, Germany, hosted a successful systems design review in September 1999. The next major technical review will be the preliminary design review scheduled for the Raytheon site in Tucson, AZ, in February 2000.

The next program management review will be held in Tucson, in February 2000. The flow down of

AVIATION ORDNANCEMEN HOIST A AGM-88 HIGH SPEED ANTI-RADIATION MISSILE TO A PYLON ON THE WING OF AN F-14 TOMCAT ON THE FLIGHT DECK OF USS THEODORE ROOSEVELT (CVN 71) OPERATING IN THE ADRIATIC SEA (APRIL 1999)

U.S. MARINE CORPS F/A-18C HORNET, LOADED WITH AN AIM-9 SIDEWINDER, AN AIM-7 SPARROW, AND AGM-88 HARM MISSILES, MAKES ITS FINAL APPROACH TO USS GEORGE WASHINGTON (CVN 73) IN THE PERSIAN GULF

requirements between the three principle contractors and their vendor networks is ongoing. Plans call for retrofit kit production in 2003.

MULTIFUNCTIONAL INFORMATION DISTRIBUTION SYSTEM

The Multifunctional Information Distribution System (MIDS) international program was reassigned to the Program Executive Office for Tactical Aircraft effective 31 July. The MIDS program is nearing conclusion of the Engineering Manufacturing Development (EMD) phase and proceeding to production. Since the November 1998 decision to slip the production award from April 1999 to June 2000, aggressive actions by the MIDS integrated product team accelerated this schedule to December 1999.

On 2 November 1999, the Under Secretary of Defense (USD) for Acquisition Technology and Logistics (AT&L) signed the MIDS acquisition strategy report and approved the award to two contractors for nonrecurring engineering and long lead material in December. These awards mitigate schedule risk of a September 2001 delivery and will promote competition during production. Low-rate initial production contract awards will follow in March 2000 upon completion of a successful Defense Acquisition Board. The MIDS integrated program office is simultaneously preparing for award of a sole source European production contract in March 2000, contingent upon signature of a Program Memorandum of Understanding Supplement that was verbally approved by all participants in November. The USD AT&L has obtained agreement from the international armament directors to combine and compete all U.S. and European MIDS terminal requirements between the contractors once the production manufacturers are fully industrialized.

The MIDS EMD test programs have progressed considerably, demonstrating most key performance parameters and accumulating more than 1,700 hours of terminal functional performance. The first flight of an F/A-18 with MIDS Low Volume EMD terminal occurred in January 1999. Deficiencies were experienced with initial F/A-18 Tactical Air Navigation (TACAN) flight test performance and are being jointly addressed by a government/industry-led team; corrections that will enable TACAN operational certification are expected. The Army completed limited user testing of the Army unique MIDS LVT(2) variant in October 1999, which successfully demonstrated joint-service interoperability between MIDS and joint tactical information distribution system terminals. Test results on the MIDS LVT(3) variant (Air Force Fighter Data Link (FDL)) have been outstanding in demonstrating operational effectiveness and suitability. The Director of Operational Test and Evaluation submitted a favorable report to Congress in October, supporting the subsequent award of the first FDL production lot. The FDL program successfully demonstrates the MIDS open systems architecture and “build to” specification methodology—initiatives that support acquisition streamlining and process reforms.

A six-month extension to the MIDS EMD contract was approved at the MIDS international steering committee meeting in October. The steering committee also approved the establishment of two systems engineering and integration contracts for the U.S. and European participants. Together, these contracts will provide pre-operational support of the EMD terminals and MIDS software. MIDS will give the F/A-18 aircraft the ability to engage in fully interoperable combat missions with our North Atlantic Treaty Organization allies.

INTEGRATED DEFENSIVE ELECTRONIC COUNTERMEASURES, RADIO FREQUENCY COUNTERMEASURES

The program office completed a formal rebaseline of Integrated Defensive Electronic Countermeasures (IDECM) Radio Frequency Countermeasures (RFCM) on 15 July, and a comprehensive integrated baseline review was conducted in September. At year’s end, software development was completed, system integration was 80 percent completed, Environmental Qualification Testing (EQT) on the technique generator was completed, and a decoy EQT was underway.

The program completed the design of the decoy and canister. This led to the first of several “fast-deploy” flights. The team tested the deployment and safe separation characteristics of the decoy on four aircraft—a Lear jet, a Draken, the B-1B, and the F-16.

Laboratory integration and tests proceeded with the delivery of a series of Block II software revisions to support developmental testing/operational assessment delivery of Block IIIB software and the early delivery of Block IV software. A major redesign of forward and aft antennas was completed, giving the decoy increased radiated power and demonstrating the functionality of decoy power linearization.

Although hampered at the start by aircraft and software integration issues, RFCM developmental test flights started in late June aboard the avionics test bed and represented the first fully integrated testing of the RFCM and fiber optic towed decoy system.

The Common Missile Warning System (CMWS), part of the Advanced Tactical Infrared Countermeasures/ CMWS Army-led program, is being developed to provide passive missile warning capability for F/A-18E/F and AV-8B aircraft. The program is still in engineering and manufacturing development, and restructured in FY99 with a two-year slip added to major milestones. The F/A-18E/F program conducted a sensor repackage study to optimize sensor and algorithms for tactical air roles. The program is considering repackaging the sensor to mitigate impacts of the baseline sensor on range, acceleration, and radar cross section.

The Advanced Strategic and Tactical Infrared Expendable, a joint program led by the Air Force, is developing three advanced expendables for strategic and tactical aircraft use against modern and projected surface-to-air missile and air-to-air threats. The three flares include a kinetic decoy rocket (MJU-47/B), a two-part expendable decoy (MJU-48/B), and a covert decoy (MJU-51/B). The program is currently conducting qualification testing on the MJU-47/B and MJU-48/B. The MJU-51/B has already passed qualification tests. All three flares entered developmental test and evaluation in 1999.

AN F/A-18E SUPER HORNET STRIKE FIGHTER DEPLOYS A FLARE OVER A RANGE AT NAVAL AIR WEAPONS CENTER, CHINA LAKE

AN/ALQ-165 AIRBORNE SELF-PROTECTION JAMMER

The ALQ-165 successfully completed the largest deployment in its history, simultaneously supporting three F/A-18 C/D squadrons and one F-14D squadron aboard USS *Constellation*. The ALQ-165 also deployed with one F-14D squadron aboard USS *Lincoln* earlier this year. The new 36-system production lot from a FY97 $50 million congressional plus-up began deliveries during June. Two engineering change proposals were approved for the ALQ-165 aircraft interface units to correct cracks seen during previous carrier deployments. A new ALQ-165 operational flight program and user data file are currently being tested as part of the 2000 tactical aircraft electronic warfare suite for the F-14D and F/A-18C/Ds, as well as part of the integrated defensive electronic countermeasures Block I suite on the F/A-18E/F.

ALE-50 ADVANCED AIRBORNE EXPENDABLE DECOY

The ALE-50 is part of a joint Navy/Air Force program led by the Navy. The system consists of a launch controller magazine and the Advanced Airborne Expendable Decoy (AAED). The current launch controller, the Multiple Platform Launch Controller (MPLC), completed its second production lot in December 1999. A total of 65 MPLCs have been delivered. The MPLC is installed on the Navy Low Rate Initial Production (LRIP)-I F/A-18E/F aircraft undergoing operational evaluation.

Concurrent with production of the MPLC, a modified version of the launch controller, the Integrated MPLC (IMPLC), has been in development and will add the capability to control the Integrated Defensive Electronic Countermeasures (IDECM) Radio Frequency Countermeasures (RFCM) fiber optic towed decoy. Integration and qualification testing of the IMPLC with AAED has been successfully completed. In order to meet delivery dates required by both the F/A-18E/F and B-1B platforms, the Navy awarded Raytheon a contract to produce and deliver production IMPLCs in March. Deliveries on the first lot will begin in April 2000. Plans are to install IMPLCs in all production F/A-18E/F aircraft starting with the LRIP-II procurement.

Throughout 1999, the advanced tactical aircraft protection systems office, the F/A-18 program office, and the contractor developed and produced the Phase IV towline which demonstrated considerable improvement in heat resistant characteristics over the

THE APR-39A(V)2 RADAR WARNING RECEIVER IS TESTED ON THE AH-1W COBRA

basic towline. Anecdotal feedback regarding decoy usage in recent hostilities indicated that at least eight coalition aircraft were saved by the AAED.

AIRBORNE EXPENDABLE COUNTERMEASURES PROGRAMS

The MJU-49/B expendable countermeasure passed Milestone III. During operational tests, it exhibited superior effectiveness against advanced infrared threats. This expendable countermeasure will provide a significant increase in the survivability of Navy helicopters. Additionally, the CCU-136A/A impulse cartridge also passed Milestone III. This impulse cartridge successfully completed Hazards of Electromagnetic Radiation to Ordnance (HERO) testing, including permissible exposure limits. This is the first HERO safe impulse cartridge introduced for fleet operations and will significantly enhance personnel safety and operational flexibility.

The Airborne Expendables Countermeasures program successfully tested degradable chaff (RR-144A) as a replacement for current training rounds. The new chaff was found to be effective, environmentally safe, and non-toxic. It enhances the Navy's continuing efforts to explore new ways of reducing the environmental impact of its training ranges.

ALR-67(V)3 ADVANCED SPECIAL RECEIVER

The ALR-67(V)3 completed its Operational Evaluation (OPEVAL) on the F/A-18C/D *Hornet* in February, receiving an "operationally effective and operationally suitable" finding with a recommendation for fleet introduction. The Director of Operational Test and Evaluation subsequently issued a report that supported these findings. Based on the successful OPEVAL, the program received its Milestone III decision in July and awarded a full-rate production contract to Raytheon for 34 systems plus spares. The system completed follow-on test and evaluation on the F/A-18E/F *Super Hornet* in November. A report is due in early 2000 detailing system performance and integration on the *Super Hornet*.

In an effort to improve fleet support and reduce costs, the Navy awarded Raytheon an innovative contract to support the systems through 2004. The contract includes reliability growth provisions that will increase system reliability by 60 percent. The increased reliability is expected to result in cost savings of $125 million over the life of the systems through fewer repairs and a direct vendor delivery two-level maintenance concept.

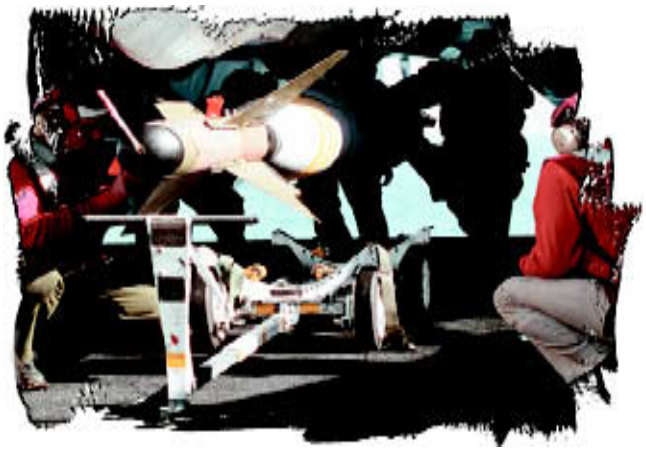
ALR-67(V)2 ADVANCED SPECIAL RECEIVER

The ALR-67(V)2 radar warning receiver system is undergoing an upgrade program in two phases. The Navy accelerated this upgrade program for the AV-8B and F-14 by one year due to a $5 million congressional FY99 plus-up. The upgrade will improve sensitivity/detection range in Phase I (FY00), and target identification through a processor and memory upgrade in Phase II (FY02).

APR-39A(V)2 RADAR WARNING RECEIVER

The APR-39A(V)2 program received a $4 million congressional plus-up to accelerate system acquisition, installation, and logistics support. The system developer, Litton Advanced Systems, delivered more than 200 systems during 1999. The APR-39A(V)2 completed its follow-on test and evaluation on the AH-1W *Cobra* in November 1999. A report is due in early 2000 detailing system performance and integration on the *Cobra*.

AVIATION ORDNANCEMEN ATTACH A 2000-LB. GBU-24 LASER GUIDED BOMB TO AN F-14 TOMCAT ON BOARD USS THEODORE ROOSEVELT (CVN 71)



F/A-18F SUPER HORNET RELEASING MAVERICK

AAR-47 MISSILE WARNING SYSTEM

The AAR-47 computer processor upgrade program completed its Operational Evaluation (OPEVAL) on the UH-1N aircraft, receiving an "operationally effective and operationally suitable" finding with a recommendation for fleet introduction from the Commander, Operational Test and Evaluation Force. Based on the successful OPEVAL, the Navy awarded Alliant Tech Systems a contract for 1,200 computer processor upgrade kits. Alliant began delivering these kits in October.

The AAR-47 sensor upgrade program conducted a critical design review in September. The implementation of several acquisition reform initiatives won the team the Service Acquisition Executive Acquisition Reform Certificate of Excellence and the Vice President's Hammer Award. This upgrade program will save aircraft significant weight and space and will reduce cycle time from development to fielding by 24 months. The expected cost savings and cost avoidance over the life of the program is expected to be $240 million.

IN-SERVICE WEAPONS TEAM

The In-Service Weapons fuze team has commenced an FMU-139 electronic bomb fuze re-booster effort. A total of 200,000 FMU-139A/B fuzes will receive a new PBXN-107 booster, a new CH-6 lead assembly, and two transient voltage suppressors. The fuzes will be re-designated as FMU-139B/B. The Naval Air Systems Command awarded a contract to Lockheed Martin Tactical Defense Systems for 7,500 laser guided training rounds. Deliveries commenced in August at a rate of 600 units per month. The MK84 2,000-lb. general-purpose bomb has completed conversion efforts and has been designated as BLU-117. The conversion involved the replacement of the explosive fill from the H-6 to the insensitive PBXN-109 explosive. The procurement of the GBU-24E/B incorporates a global positioning satellite system and is continuing with initial operational capability anticipated in October 2000.

CARTRIDGE ACTUATED DEVICES/ PROPELLANT ACTUATED DEVICES

During 1999, the Conventional Strike Weapons Program Office delivered approximately 235,000 Cartridge Actuated Devices/Propellant Actuated Devices (CAD/PAD) to the Fleet for aircraft installs and operations involving stores release. The program office successfully reengineered the supply support process, reducing the average resupply cycle time from 120 to 7 days during prototype, and implemented it across the continental U.S. Internet technology is being used to provide the Fleet direct access to CAD/PAD data. At an annual cost savings of $200,000, the office has established the use of an electronic technical manual via compact disk read-only memory. This achievement has eliminated more than 100,000 sheets of paper per revision and the need for routine interim rapid-action changes.

MAVERICK

There are two versions of the AGM-65 *Maverick* missile that are in service in more than 20 countries. The AGM-65E *Laser Maverick*, used extensively in the Gulf War, is a short-range, air-to-surface weapon. It is used by Navy and Marine Corps aircraft for close air support and battlefield interdiction within amphibious objective areas and in deep support for the destruction of targets outside objective areas. The AGM-65F imaging-infrared *Maverick* is an air-to-surface, direct-attack weapon designated for day or night use by Marine and Navy aircraft. It is fitted with an imaging infrared seeker and uses the same warhead as the *Laser Maverick*. The *Maverick* can be launched from F/A-18, AV-8, S-3, or P-3 aircraft.

The venerable AGM-65E *Laser Maverick* missile served as the Fleet's weapon of choice in the Kosovo campaign this past year. The Navy has scheduled this air-to-ground missile system to be phased out of its active weapons' inventory between 2000 and 2010. The Joint Standoff Weapon Unitary is slated to replace the *Maverick* while the modernized *Hellfire* is expected to pick up some of the *Maverick's* mission against mobile and armored targets. The Fleet, however, wants to keep this missile as a "tip-of-the-spear" asset and has highlighted *Maverick* as a near-term weapon of choice when called to fight. The strike weapons operational assessment group held in San Diego, CA, in November, encouraged Navy and Marine weapons requirement officials to ensure this weapon's place in the inventory until future weapons are proven.

PROGRAM EXECUTIVE OFFICE: AIR ANTI-SUBMARINE WARFARE, ASSAULT, AND SPECIAL MISSION PROGRAMS

AV-8B HARRIER

The Marine Corps AV-8B *Harrier* vertical short take-off and landing aircraft remanufacture program continues to update earlier day attack AV-8B aircraft into the latest night/radar version equipped with APG-65 radar. The APG-65 radar, already operational in more than 1,100 aircraft worldwide, enhances the *Harrier's* close air support mission in day, night, and all-weather operations. This variant of the *Harrier*, carrying up to 13,200-lbs. of ordnance, including air-to-air and air-to-ground missiles, gives the Marine Corps and the Italian and Spanish Navies the capability they need to meet the warfighting demands of the early 21st century. During FY99, Boeing delivered nine AV-8B remanufactured aircraft to the Marine Corps. The Harrier program remains the only collaborative program in naval aviation managed by the Italian, Spanish, and U.S. Navies.

This year marked the initiation of the TAV-8B trainer aircraft upgrade program. This effort includes upgrading 18 TAV-8B aircraft to a configuration closer to our radar and night attack aircraft configurations. Upgrades include night vision goggle compatible lighting and the F402 and F408 engine installation.

A major accomplishment of the AV-8B cooperative program is the Open System Core Avionics Requirements (OSCAR). OSCAR will support product team development, integration, testing, production, and delivery of commercial off-the-shelf computers and rewritten software, using higher order language to replace current AV-8B aircraft systems.

AV-8B HARRIER II+ DROPPING A PRACTICE LASER-GUIDED BOMB

OSCAR will reduce life cycle costs of future system upgrades to the *Harrier* fleet, allowing affordable improvements to the warfighting capabilities of the Marine Corps and the Italian and Spanish Navies. During 1999, OSCAR completed and flight tested Iteration-IV OSCAR software (flew Mission Systems and Warfare Management Computers together for the first time), created an earned value management system for OC1.1 and completed integrated baseline review.

Additionally, the AV-8B completed a rapid prototype integration of a Litening I Targeting Pod that led to a FY00 Kosovo funding supplement for nine Litening II Pods.

CH/MH-53E SUPER STALLION

The *Super Stallion*, an indispensable workhorse, is vital to the Fleet's assault and heavy-lift capability and airborne mine countermeasures mission. The *Super Stallion* continues to undergo improvements that increase operational readiness and safety. Modifications, such as a night vision system, heads-up display, global positioning satellite system, UHF/VHF jam-resistant radios, crashworthy seats, and number two engine fire detectors, enhance the aircraft's survivability and capability.

During 1999, the Navy awarded a contract to Martin-Baker for the development and installation of the crashworthy attenuating troop seats system.

H-53/H-60/H-1 INTEGRATED MECHANICAL DIAGNOSTIC HEALTH AND USAGE MONITORING SYSTEM

The H-53/H-60 team made substantial progress in 1999 toward fielding an Integrated Mechanical Diagnostic (IMD) Health and Usage Monitoring System (HUMS) for Navy and Marine Corps helicopter operators. This reduced total ownership cost initiative will integrate, test, and procure a commercial/military "dual use" HUMS from BF Goodrich Aerospace for the H-53E, H-60, and H-1 helicopters. This system will reduce operations and support costs, improve operational readiness, and increase flight safety through the early identification and correction of degraded components in the engine, drive train, and rotor systems of the helicopter.

In May 1997, the Defense Advanced Research Projects Agency selected the IMD program as a Commercial Operations and Support Savings Initiative (COSSI). This COSSI award facilitated extensive streamlining of the acquisition process.

In January 1999, the Program Executive Officer approved the IMD HUMS acquisition strategy for the H-53, SH-60R, and CH-60S helicopter programs.

THE CH-53E REMAINS INDISPENSABLE TO THE FLEET'S ASSAULT AND HEAVY-LIFT CAPACITY

After successful installation of the IMD prototypes in both a CH-53E and SH-60B, IMD HUMS commenced development flight tests in the CH-53E at Patuxent River, MD, in September 1999. This testing included rotor track and balance, regime recognition for structural usage monitoring, and naval aviation vibration analysis program algorithms. Release and subsequent testing of the initial ground-based system and onboard system software has resulted in successful information downloads.

In May 1999, the H-1 helicopter received an IMD COSSI award, and in December 1999, the Program Executive Officer approved an acquisition strategy change that added procurement of the H-1s and the legacy H-60B/F/H helicopters to the IMD HUMS program.

VH-3D/VH-60N EXECUTIVE TRANSPORT HELICOPTERS

Executive transport helicopters provide helicopter transportation for the President and Vice President of the United States, members of the President's cabinet, and foreign dignitaries. Three installations of crash survivable flight incident recorders, which will enhance safety and survivability, were completed in 1999. Additionally, program managers fielded two ground support equipment initiatives that not only enhance the mission effectiveness of executive transport helicopters, but also have potential for other Navy aircraft. The versatile huffer unit has been fielded to replace the GTC-85 "bullet huffer" and the MA-1A "air start unit", and incorporates both start air and electrical power for the VH-60N. The versatile hydraulic cart is a replacement for the UH-60 *Blackhawk* air transportability cart and is used during Air Force C-5 and C-17 on-load/off-load operations. These initiatives provide cost benefits to the Navy by using commercial off-the-shelf technology and common aircraft inventory parts.

During 1999, Sikorsky Aircraft Corporation completed and delivered three VH-3D aircraft under the Service Life Extension Program (SLEP), which extends the life of the aircraft by another 6,500 hours and increases maximum gross take-off weight by 1,000-lbs. Sikorsky also delivered two VH-60N aircraft under the Midlife Upgrade (MUG), which enhances the helicopter's reliability and maintainability. As part of both SLEP and MUG and in support of crash survivable flight incident recorders, Operational Flight Profile 7.0 software was developed, tested, and delivered. An auxiliary power unit engineering change proposal was approved, and the aircraft was successfully prototyped and tested.

SONOBUOYS AND SENSORS

Since World War II, development of air-launched sonobuoys and sensors has been a priority in Air Anti-Submarine Warfare (ASW). Exploiting technology to achieve superiority for the Warfighter has been the goal of research and development efforts. As the nature of ASW continues to change, PMA 264 acts as the lead office for cross-platform development of improved Air ASW sensors necessary to meet any potential threat. During 1999, the TEAM delivered more than 65,000 sonobuoys to the Fleet for operational use.

Sonobuoys include three basic types: passive sonobuoys that detect noises from submarines; active sonobuoys that detect acoustic pulses bounced off submarine hulls; and special purpose sonobuoys that measure the ocean water temperature profile or communicate with submarines. To reduce production and logistics support costs for sonobuoys, program managers developed a plan to merge the functionality of these three types into one multi-function unit.

EXECUTIVE TRANSPORT HELICOPTERS PROVIDE TRANSPORTATION TO THE PRESIDENT AND VICE PRESIDENT OF THE UNITED STATES, AS WELL AS MEMBERS OF THE PRESIDENT'S CABINET, AND FOREIGN DIGNITARIES

During 1999, the program office completed its first affordable readiness initiative, modifying a C-12 utility aircraft for sonobuoy acceptance testing. The aircraft is currently in use at North Island, CA. Using the C-12 significantly reduces the cost of testing and frees the Fleet from having to provide aircraft for testing.

The sonobuoy program also achieved Milestone III approval for the Air Deployable Active Receiver (ADAR) sonobuoy on 6 May. The ADAR detects acoustic pulses bounced off submarines as part of the Improved Extended Echo Ranging (IEER) program. The new integrated ADAR/IEER system will provide a significant improvement in Air ASW shallow water capabilities.

During 1999, the program office also started a new initiative designed to improve the process in which new software capabilities are introduced into the Fleet. The process uses commercial software development tools to design, code, and test acoustic signal processing software that can be targeted to any commercially based processor. If successful, this will provide a road map and process for Navy Air ASW program managers to select the most cost effective and commercially available hardware for their acoustic signal processing suites without having to experience the technical problems and schedule delays often related to software integration.

Realistic training provides our Warfighters with the edge they need to maintain sea superiority. The Generic Acoustic Stimulation System (GASS) program is designed to provide the highest quality in acoustic fidelity and environmental realism for acoustic simulations—especially for littoral and shallow water training scenarios. Using GASS, Air ASW crews can train for any region in the world, against any possible target, using whatever sensor they choose. GASS also minimizes the cost of introducing new acoustic signal processing software capabilities into individual weapon system trainers. The program passed a major milestone in December 1999, when a critical design review was held at the contractor's facility in Melville, NY.

THE E-6 A/B MERCURY CONTINUES TO PROVIDE A CRUCIAL LINK BETWEEN NATIONAL COMMAND AUTHORITY AND U.S. STRATEGIC FORCES

Another notable achievement involved the Advanced Radar Periscope Detection and Discrimination (ARPDD) system. This advanced sensor, which provides automatic detection and classification capabilities, underwent successful testing aboard USS *Stump*, demonstrating extremely low false alarm rates with 10 times greater detection sensitivity than conventional radar. The ARPDD system was installed aboard a Naval Research Laboratory P-3 aircraft for airborne testing and evaluation. The ARPDD system was used during several exercises during the year.

E-6A/B MERCURY

The E-6A/B Mercury Take-Charge-and-Move-Out (TACAMO) mission provides survivable, reliable, worldwide communications between the National Command Authority and U.S. Forces. The E-6B Airborne National Command Post provides Command, Control, Communications, and Intelligence (C^4I) to direct strategic forces. The Navy's E-6 fleet constitutes 80 percent of the nation's airborne survivable mobile command center structure and is a vital component of the core of our national defense policy.

The Airborne Strategic Command, Control and Communications program office continues to upgrade the 16 E-6 aircraft to the E-6B configuration; nine of 16 modifications have been completed, with the final modification due in 2003. The Navy awarded the program office a certificate of excellence for employing acquisition reform practices that ensured the successful accomplishment of the E-6B Initial Operational Capability in October 1998.

The program's strategic plan paves a clear path to further improvements for the Warfighter. The Multifunction Display System (MDS) program, which installs the commercial Boeing 737-700 cockpit into the E-6 fleet at significant cost savings, provides the basis to capitalize on commercial investment to meet future communications, navigation, surveillance, and air traffic management requirements. The MDS program achieved approval for full-rate production in 1999. The joint Navy/Air Force Modified Miniature Receive Terminal program replaces obsolete VLF/LF receiver systems in the E-6 and E-4 Advanced Airborne Command Post. Developmental testing commenced in 1999 for the E-6 modification program.

JOINT PRIMARY AIRCRAFT TRAINING SYSTEM

The Joint Primary Aircraft Training System (JPATS) consists of the T-6A *Texan II* aircraft, simulators and computer-aided academics. This joint program, with the U.S. Air Force acting as the executive service, is developing a common training system, which will replace the Navy T-34C and Air Force T-37B systems. The program uses commercial off-the-shelf subsystems to the maximum extent possible. The aircraft is a derivative of the Swiss Pilatus aircraft with a PT-6 engine and an ejection seat.

The T-6A entered developmental flight testing in 1998 and the program began delivery of aircraft under an engineering and manufacturing development contract. Four aircraft are presently in the development flight test program. Multi-service operational test and evaluation of the T-6A is planned to begin in March 2000. The Navy aircraft and ground-based training systems will be completely supported and maintained by commercial vendors. The aircraft also uses commercial avionics wherever possible. Depot-level maintenance will be provided by the original equipment manufacturers with intermediate maintenance provided for selected systems at the operating site. This will result in the minimum total ownership cost of the system.

The JPATS will be operational at a combined total of 12 Navy and Air Force bases when fully fielded. The Air Force Initial Operational Capability (IOC) is scheduled for 2001 with Navy IOC in 2003.

T-45 TRAINING SYSTEM

The T-45 training system integrates flight and ground training for intermediate and advanced student naval aviators in the strike and E-2/C-2 training programs. The system includes the T-45 *Goshawk* aircraft, simulators, and computer-aided instructional subsystems. The system is operational at Naval Air Station (NAS) Kingsville, TX, and at NAS Meridian, MS. The T-45 integrated training system produces carrier qualified naval aviators quicker and at less cost than previous naval jet trainer aircraft.

The T-45C entered service in 1998 at NAS Meridian. Twenty-nine of these aircraft, configured with a state-of-the-art “glass” cockpit, are presently in service. This capability greatly improves the training experience of student naval aviators and improves transition to fleet aircraft.

The T-45 team has continued the development of the Gosnet Electronic Data Interchange system using World Wide Web technology to deliver all required

STUDENT NAVAL AVIATOR IN A T-45 GOSHAWK, LAUNCHING FOR CARRIER QUALIFICATIONS

contract data. The Gosnet connects all Navy sites and contractors using an extranet approach. This system greatly improves integrated product team coordination throughout the team, allowing prompt dissemination of technical information and required contract deliverables. The T-45TS uses Contractor Logistics Support (CLS) for all levels of maintenance. The T-45 team awarded the Boeing Company a contract for CLS in April 1999. The five-year (one base year with four option years) contract calls for the company to provide all logistics support for the T-45 training aircraft and related ground training systems at Kingsville and Meridian. The competition allowed the program to award the contract at significantly reduced cost from previous CLS contracts. Based on these and other accomplishments, which took place in 1998, the T-45 program office was awarded its second Defense Acquisition Excellence Award.

V-22 OSPREY

During 1999, the V-22 began the transition from development to production with the delivery of Aircraft number 11, the first Low-Rate Initial Production (LRIP) aircraft to the Marine Corps on 27 May. This aircraft is currently being used in support of Operational Evaluation (OPEVAL). The MV-22’s (Marine Corps variant) OPEVAL began in November and will continue through the spring of 2000. It will consist of four LRIP aircraft flying more than 700 flight hours during 350 sorties to conduct extensive operationally representative missions from air capable ships,

airfields, remote sites, confined areas, and major range and test facilities. Locations hosting the V-22 OPEVAL include Marine Corps Air Stations in North Carolina and Arizona; Air Force Special Operations Command at Hurlburt Field, FL; Naval Air Warfare Center Weapons Division in China Lake, CA; and the air capable ships located on each coast. Milestone III for the V-22 is planned for October 2000.

During its very successful sea trials, conducted during January and February of 1999, the MV-22 completed more than 350 landings and tests aboard USS *Saipan* off the coast of Norfolk, VA. The sea trials tested the *Osprey's* suitability for operations aboard large deck amphibious ships, as well as assessed all of its maintenance and support requirements while at sea.

The Osprey program garnered several honors during the year including the Department of Defense (DoD) Acquisition Executives Certificate of Achievement for Excellence in Acquisition Reform. The DoD also awarded its Value Engineering Achievement award to the V-22 program for "aggressively pursuing ways to reduce V-22 acquisition and life cycle costs." In addition, a cadre of V-22 pilots received the Frederick L. Feinberg Award for pioneering the developmental test program for the revolutionary V-22 tiltrotor aircraft.

Tiltrotor Day at the Pentagon, sponsored by DoD, was an opportunity to showcase tiltrotor technology to a wide audience that included members of Congress, national and international media, and senior military personnel. The event's guest speaker, Secretary of Defense William Cohen said, "Every few decades of this century, the world has witnessed the arrival of weapons platforms that have truly revolutionized national security. The powerful and innovative aircraft you see here today, the tilt-rotors, will have just that effect in the coming century."

MV-22 ENGINEERING AND MANUFACTURING, DEVELOPMENT AIRCRAFT PERFORMS AN EXTERNAL LOADS MISSION ABOARD USS SAIPAN (LHA 2) DURING SEA TRIALS (AUGUST 1999)

USMC LIGHT/ATTACK HELICOPTERS

The AH-1Z and UH-1Y provide the most potent and cost effective alternative for the U.S. Marine Corps (USMC) light/attack helicopter requirements in the 21st century. The USMC H-1 upgrades program was established as a mid-life revitalization for the formidable AH-1W *SuperCobra* and the workhorse UH-1N *Huey.* With 85 percent commonality of major drive, propulsion and rotor systems—combined with a new target sight system, integrated avionics system and glass cockpit—the modification of these aircraft significantly enhances lethality, speed, maneuverability, safety and payload, while decreasing pilot workload and increasing situational awareness.

H-1 upgrades development completed several important milestones in 1999 on the way to first flight and low-rate initial production for both aircraft. After a detailed cost/benefit analysis, the team decided to conduct AH-1Z and UH-1Y flight testing at Patuxent River, MD. Engineers successfully completed preliminary and critical design reviews of Lockheed Martin's AH-1Z Target Sight System (TSS) in February and July 1999, respectively. The TSS provides advanced third generation thermal image processing, eye-safe laser range finding, target designation, and full fire control integration. Throughout the year, AH-1Z and UH-1Y aircraft development progressed steadily and successfully through the component testing schedule, completing preliminary main gear box qualification tests, flaw-tolerant drive shaft testing, lighting mock-up tests, and required landing gear drop tests. Litton Guidance and Control Systems delivered a Functional Equivalent Unit mission computer and all Integrated Avionics System hardware necessary to test the integrated avionics suite at Bell Helicopter's systems integration laboratory.

The AH-1W, operating from ship and land, provides close air support, armed escort, fire support coordination, and reconnaissance. Two major AH-1W improvements were approved for 2000: the improved crew restraint system, consisting of an MA-16 inertial reel and five-point restraint harness; and a modified missile control assembly that will significantly improve tube-launched optically-tracked wire-guided missile firing capability. Additionally, an effort was initiated to replace current electrical engine control units with digital engine control units that are equipped with auto-

UH-1N
TAKING OFF FROM PATUXENT
RIVER NAVAL AIR STATION

ignitions to eliminate in-flight flameouts. Several other improvements, such as the night targeting system, infrared beacon and infrared strip lights, will improve safety at night.

The UH-1N, which operates from ship and land, provides command and control support, search and rescue, assault support, and medical evacuation capabilities. The *Huey* received an AN/AAQ-22A upgrade to a third generation sensor this year, which doubled the detection range. When used with the latest software, this upgrade permits automatic calculation of target positions upon laser ranging. Additionally, several other improvements were incorporated that enhance UH-1N safety and operational capability. Those improvements include tail rotor drive system replacements, internal rescue hoist replacements, tail gearbox seals, and low maintenance batteries.

P-3C ORION

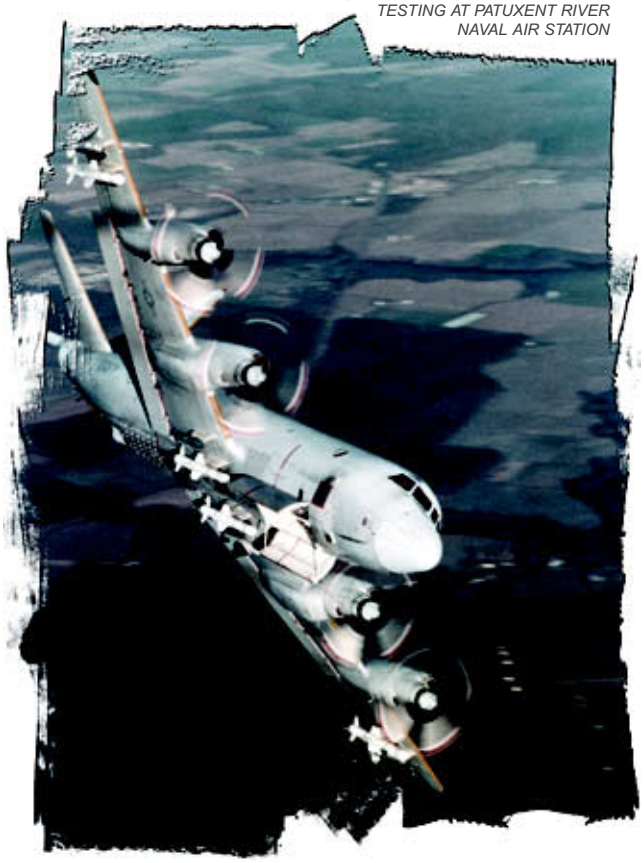
The *Orion* is a land-based, long-range aircraft that provides the Fleet with significant mission capabilities in the areas of Anti-Surface Warfare (ASuW); Anti-Submarine Warfare (ASW); Command, Control, Communication, Computers and Intelligence (C^4I); battle group support; littoral surveillance; and aerial mining. The ASuW Improvement Program (AIP) provides a significant increase in the P-3C's ASuW, ASW, C^4I, and Over the Horizon targeting capabilities. Twelve AIP aircraft were delivered in 1999 for a total of 22 aircraft delivered to date.

In 1999, the P-3C Block Modification Upgrade Program executed a procurement option to convert 22 P-3C Update II and II.5 aircraft to the Update III mission system configuration. The upgrade program restarts the Update III production line and addresses obsolescence issues with new processors, receivers, displays, and recorders. The Sustained Readiness Program (SRP) was designed to recapture the operational service life of P-3C aircraft by preemptively replacing and refurbishing airframe components and systems identified as having impact on future aircraft availability due to readiness, safety, corrosion, and unsupportability. By the end of 1999, the Fleet had received a total of six SRP aircraft. A program to install Global Positioning Satellite (GPS) systems on P-3 aircraft continued in 1999. To date, 209 of 219 P-3 aircraft have received this GPS modification.

EP-3E ARIES

The EP-3E *Aries* is a land-based, long-range aircraft with electronic intercept devices for detection and tracking of enemy radar and radios. The *Aries* provides vital enhancement of the Fleet's electronic warfare capability by reporting real-time threat activity and intentions beyond the battle group's horizon. The EP-3E Sensor System Improvement Program (SSIP) procures, integrates, and installs new capabilities into the EP-3 Electronic Warfare Support Measures system to cope with the increasingly complex and dense threat environment. Following closely is the Joint Airborne Signal Intelligence (SIGINT) family modification program, an evolutionary upgrade program to the EP-3E, which includes the Joint Airborne SIGINT Architecture-compliant low-band sub-system. Concurrent with the SSIP configuration upgrade, a program is underway to replace the ARC-206 radios with ARC-187 radios.

P-3C UPDATE III, FORCE WARFARE CONDUCTING
TESTING AT PATUXENT RIVER
NAVAL AIR STATION



S-3B VIKING

The S-3B *Viking* is a carrier-based, all weather, high-wing, high-subsonic twin engine multi-mission aircraft. As part of modernization efforts, the S-3B critical avionics program is underway to replace obsolete and unsupportable UHF/VHF radios; and to replace the Carrier Airborne Inertial Navigation System (CAINS) and both the armament control and tactical mission display systems. Engineers completed developmental and operational testing for the communications improvement program and the Fleet received its first CAINS II modified aircraft in 1999. The CAINS II modification is being combined with the USH-42 video recorder and global positioning satellite installations to reduce the total cost of all three modifications and increase aircraft availability.

Another element of the critical avionics program is a solid-state, digital replacement for the current flight data computer. The new Digital Flight Data Computer (DFDC) is designed as a form and fit replacement for the current system. The Viking test team successfully completed carrier suitability testing of the DFDC in September 1999 with initial operational capability expected for May 2000. The first prototype replacement units for the current tactical coordinator/sensor operator displays recently completed test and evaluation. The new displays are designed to be a form, fit, and function replacement for both rear seat ASA-82 displays, which are nearing obsolescence. In 1999, prototyping of the S-3B Integrated Maintenance Concept effort got underway. It is expected to improve aircraft material condition and improve aircraft availability by reducing out-of-service time. The S-3B Surveillance System Upgrade (SSU) is intended to expand the *Viking's* traditional Anti-Surface Warfare (ASuW) role to include precision surveillance and targeting. Filling the niche between the capabilities of the Air Force's Joint Surveillance Tracking and Reconnaissance (JSTARS) aircraft and unmanned aerial vehicles, such as *Predator*/*Pioneer*, the S-3B SSU can provide "man-in-the-loop", real-time, surveillance and targeting of littoral and overland targets in a direct support, carrier-based role. Leveraging the program office's recent success with the P-3C ASuW Improvement Program, the carrier-based S-3B SSU will share a common role and some common sensors/systems.

H-60 SEAHAWK

At the core of the Navy's Helicopter Master Plan, the H-60 will remain the premier platform in the Navy's rotary-wing inventory. Under current remanufacture, modification, and envelope (mission) expansion programs, the Navy will decrease the current helicopter inventory from eight type/model/series of five basic airframes to two-plus variants of the H-60 airframe. The resulting cost savings and infrastructure

S-3B VIKING ATTACHED TO SEA CONTROL SQUADRON 21 (VS-21), THE "FIGHTING REDTAILS", CONDUCTS AIR OPERATIONS NEAR USS KITTY HAWK (CV 63) IN THE SEA OF JAPAN (NOVEMBER 1999)

reduction will ensure the health of Navy rotary-wing aviation well into the 21st century.

SH-60B/SH-60F/HH-60H ANTI-SUBMARINE WARFARE HELICOPTER

The forefront of today's operations are the capabilities of the H-60 aircraft operating around the world. The unmatched safety record of the Navy's *Seahawk* fleet is testimony to the ongoing reliability and maintainability efforts, as well as the implementation of several system safety enhancements. These improvements include changes to both aircrew restraints and stabilator controls. Continued coordination with the Fleet has laid the groundwork for the identification of necessary safety improvements for inclusion in future budget requests.

Implemented in 1996, the H-60 program's Integrated Maintenance Concept provides total life cycle preventive maintenance based on Reliability Centered Maintenance principals. Total projected cost avoidance through FY13 is estimated to be $90 million. This concept moves the maintenance activities closer to the user and reduces the number of aircraft in the maintenance pipeline by an estimated 18 airframes. This reduction of pipeline assets is critical to the success of planned modifications under the Helicopter Master Plan (HMP). Also, the Service Tour Extension Program (STEP) was implemented in 1998 to provide the necessary upkeep at considerable cost savings for aircraft scheduled for remanufacture under the HMP. Prototyping of these two maintenance efforts was conducted on both coasts during 1999.

The 1999 initiatives to reduce the operating costs of fleet aircraft included the use of new technologies for corrosion detection and prevention, and onboard

systems monitoring the Integrated Mechanical Diagnostic/Health and Usage Monitoring Systems (IMD/HUMS). The introduction of equipment such as new batteries with improved characteristics will reduce maintenance requirements. The IMD/HUMS allows better visibility into aircraft material and mechanical condition. STEP inspections were completed on 11 aircraft and initiated on 10 additional aircraft at two sites, providing significant improvements to the material condition of fleet aircraft.

During 1999, program managers oversaw the successful completion of both the developmental and operational test requirements for the SH-60B Armed Helicopter system. Developmental testing included the first Department of the Navy firing of the AGM-114K *Hellfire* Missile with pulse interval modulation, a counter-countermeasure. Operational testing demonstrated the joint operability of the Armed Helicopter system in joint firing events with Army AH-64 *Apache* helicopters. This resulted in a finding of "operationally effective" with marked improvement over current systems.

SH-60R MULTI-MISSION HELICOPTER

The Light Airborne Multi-Purpose (LAMPS) System MK III Block II/Multi-Mission Helicopter upgrade will provide the Navy with a multi-mission platform capable of conducting undersea and surface warfare for the next 20 to 25 years. A critical part of the Navy Helicopter Master Plan, SH-60B/F aircraft will be remanufactured to a new configuration designated SH-60R. The primary requirement for the SH-60R is to support warfare in both the littoral and blue-water environment: undersea warfare; anti-surface warfare; area surveillance and combat identification; naval surface fire support; search and rescue; and traditional rotary-wing support roles.

In addition to the capability upgrade, the remanufacturing process includes concurrent standard depot-level maintenance, a Service Life Extension Program (SLEP), and incorporation of engineering change proposals to reduce life cycle costs. SLEP will increase the life of the airframe from 10,000 to 20,000 hours and increase its structural weight capability from the current limit of 21,884-lbs. to 23,500-lbs. During 1999, contracts were awarded to Lockheed Martin Federal Systems for Engineering and Manufacturing Development Phase II of the avionics upgrade, and Sikorsky Aircraft Company for the SH-60R test articles. Incremental Critical Design Review (CDR) for the final SH-60R design was initiated in September for a final CDR in February 2000. The first SH-60B aircraft to be remanufactured to the SH-60R configuration was inducted to the Sikorsky Aircraft Corporation in Troy, AL, on 15 December.

The SH-60R program achieved a significant milestone in September 1999 when the AQS-22 Airborne Low Frequency Sonar (ALFS) successfully completed Developmental Testing (DT). ALFS met or exceeded all DT requirements and was recommended to proceed to Operational Assessment (OT-IIA), which concluded in December. Also during 1999, steps were taken to reduce life cycle costs through the use of common avionics between the SH-60R and CH-60S. This "common cockpit" development includes the use of a commercial off-the-shelf mission processor. First flight of the SH-60R prototype with the common cockpit occurred on 11 December to initiate the contractor flight testing at Lockheed's site in Owego, NY.

CH-60S FLEET COMBAT SUPPORT HELICOPTER

The CH-60S is designed as a high-reliability, low-maintenance aircraft for conducting vertical replenishment, day/night, ship-to-ship, ship-to-shore, and shore-to-ship external transfer of cargo, including internal transport of passengers, mail, and cargo. The aircraft also supports vertical onboard delivery, airhead operations, and day/night search and rescue. The aircraft's secondary roles include torpedo and drone recovery, non-combatant evacuation operations, and support of Navy Sea Air Land and Underwater Demolition Team forces. Pending the outcome of the YCH-60S tow demonstration, airborne mine countermeasures may be added as either a primary or secondary role for the CH-60S, expanding the organic capability of carrier battle groups and amphibious readiness groups.

The CH-60S will replace the Navy CH-46D, giving the Navy improved external vertical replenishment lift and combat search and rescue capability. In addition, the CH-60S has the potential to replace the MH-53E and transition the Airborne Mine Countermeasures Mission (AMCM) from a dedicated to organic capability.

SH-60 SEAHAWK ATTACHED TO LIGHT HELICOPTER ANTI-SUBMARINE SQUADRON 47 (HSL-47) FIRES AN AGM-114B HELLFIRE MISSILE WHILE ON A TRAINING EVOLUTION OFF THE COAST OF SAN CLEMENTE ISLAND , CA (AUGUST 1999)

State-of-the-art design and manufacturing tools, such as computer-aided, three-dimensional interactive software, an integrated wiring system, and advanced production technology, have resulted in reduced aircraft weight and cost.

During 1999, the contractor delivered the first two production CH-60S aircraft and received a contract for six low rate initial production aircraft. The analysis, engineering change design, and modifications to a CH-60 airframe were completed to support AMCM tow demonstration Phase I flights. In conjunction with the H-60 Fleet Introduction Team, an accelerated H-46 retirement plan was established, detailing an operational cost savings of $433 million.

PROGRAM EXECUTIVE OFFICE: CRUISE MISSILES AND JOINT UNMANNED AERIAL VEHICLES

TOMAHAWK

This year, British and U.S. forces fired more than 200 *Tomahawk* missiles with unitary and sub-munitions warheads in support of Operation ALLIED FORCE. During this operation, the *Tomahawk* missile continued to demonstrate its exceptional reliability and precision accuracy. Operation ALLIED FORCE included the 1,000th *Tomahawk* tactical firing, as well as the first *Tomahawks* fired by our closest ally, the United Kingdom.

The demand for this weapon prompted Congress to appropriate funding to remanufacture 624 older *Tomahawk* missiles to the current Block III configuration. The Tomahawk team was able to place the prime contractor, Raytheon Missiles Systems Company, under contract within two weeks of funding receipt. This contract was defined within 12 weeks, using a price-based negotiation strategy that yielded one of the largest price-based contracts awarded to date. The Block III *Tomahawk* will be an integral part of our national strategy for years to come.

Tactical Tomahawk engineering and manufacturing development continued this year with the completion of the preliminary design and the start of sub-component critical design reviews. With initial operational capability planned in FY03, the operational commanders will soon have an even more responsive, long-range, precision strike weapon to augment their arsenal.

ADVANCED TOMAHAWK WEAPON CONTROL SYSTEM

Phased development of the Advanced *Tomahawk* Weapon Control System (ATWCS) continued in 1999, including successful completion of developmental test and evaluation in August 1999, for the ATWCS Launch Control Group Replacement (LCGR). Program officials initiated operational test and evaluation of ATWCS LCGR in October, with completion in December 1999. ATWCS LCGR complements last year's introduction of ATWCS's track control group replacement. Together, these two systems complete the replacement of obsolete 1970's technology by leveraging commercial off-the-shelf computer technology to initiate and launch *Tomahawk* land attack missiles on surface combatants and fast attack submarines.

TACTICAL TOMAHAWK WEAPON CONTROL SYSTEM

The *Tactical Tomahawk* Weapon Control System (TTWCS) development contract was awarded to Lockheed Martin Management and Data Systems in May. TTWCS is the next evolutionary upgrade to the Advanced *Tomahawk* Weapon Control System (ATWCS). It supports the *Tactical Tomahawk*, providing increased system flexibility, reduced system response time to enable engagement of emerging and re-locatable targets, and improved lethality against a wider target set.

HARPOON MISSILE

The *Harpoon* missile continued to be the main Anti-Surface Warfare (ASuW) missile aboard U.S. Navy surface ships. It is envisioned that *Harpoon* will remain the front-line ASuW weapon in the U.S. inventory through 2015.

In foreign military sales, 127 *Harpoon* missiles were delivered to five international customers. Four new customers expressed interest in procuring the *Harpoon* weapon system. One of those potential customers has a Letter of Offer and Acceptance

CREWMEN ABOARD USS NORFOLK (SSN 714) SECURE A TOMAHAWK MISSILE CAPSULE TO THE PIVOT TRAY IN THE SHIP'S TORPEDO ROOM FOLLOWING A SUCCESSFUL LAUNCH OF THE CRUISE MISSILE

outstanding, and another one is in progress. To ensure continued international sales of *Harpoon*, a Section 845 agreement was signed with Boeing Company to develop, test, and produce the *Harpoon* Block II missile, which will become operational in 2002. *Harpoon* Block II will incorporate an integrated global positioning satellite system/inertial navigation system to greatly enhance effectiveness in a congested littoral environment and provide an accurate strike capability against land-based targets. The agreement includes a provision for the Navy to procure *Harpoon* Block II retrofit kits, should the Navy decide to upgrade their *Harpoon* inventory. A Section 845 agreement is being negotiated with Delex Systems for *Harpoon* Block II international tactical training.

SHIPBOARD COMMAND LAUNCH CONTROL SYSTEM

The *Harpoon* Weapon Control System integrated product team successfully completed development and testing of *Harpoon* Shipboard Command Launch Control System (HSCLCS) version 9/10 aboard USS *Elliot* in May. The HSCLCS version 9/10 was designed to provide complete automatic engagement planning for littoral warfare. Version 9/10 has resulted in a significantly faster, more capable and more efficient planning system, incorporating a number of *Harpoon* operator evaluation aids based on fleet recommendations. Version 9/10 also reduces operator workload.

In the Foreign Military Sales (FMS) area, program managers completed the successful procurement of upgrade kits and new HSCLCS for nine FMS countries. These upgrades will provide the basis for further improvements to version 9/10. Additionally, 13 foreign ships and two submarines gained *Harpoon* capability, while 30 FMS *Harpoon* systems received upgrades. In addition, the program office procured upgrades to HSCLCS version 9/10 for 99 ships in 9 foreign navies.

CRUISE MISSILES COMMAND AND CONTROL PROGRAM

The Theater Mission Planning Center (TMPC) program completed installation of the Year 2000 Y2K-compliant TMPC Version 3.03 at all ashore and afloat sites. TMPC Version 3.04, which includes user timeline improvements to the digital imagery workstation suite, was installed at all sites. The program office oversaw follow-on test and evaluation of TMPC Version 3.1 that included the post digital, scene matching, area correlator global positioning satellite system capability conducted at the Pacific Command's Cruise Missiles Support Activity.

Four carrier battle groups successfully completed deployments with the *Tomahawk* Afloat Planning System and Joint Service Imagery Processing System, which the Navy installed. These systems were successfully used to execute a series of *Tomahawk* land-attack missile and tactical aircraft-launched precision guided munition strikes in Operations DESERT FOX, ALLIED FORCE, and NOBLE ANVIL.

At the direction of the Chief of Naval Operations, the Washington Planning Center (WPC) performs a technical analysis that includes independent aim-point verification, missile arrival, missile history analysis, and mission validation after each operational *Tomahawk* land-attack missile firing. The WPC coordinates the reconstruction effort between organizations including the Naval Air Systems Command, the Naval Surface Warfare Center Detachment in Port Hueneme, CA, the Naval Undersea Warfare Center, the Naval Sea Systems Command, and the operational chain of command for each strike.

Other *Tomahawk* Land-Attack Missile (TLAM) reconstruction accomplishments for 1999 included providing tools for the number of TLAMs required for contingency strike planning and spearheading the TLAM realignment policy. Reconstruction efforts also provided real-time analysis of specific strikes during Operation ALLIED FORCE and conducted briefings throughout technical and operational communities in addition to serving as a TLAM data resource center. The data resource center provided information to various organizations, including the Office of the Chief of Naval Operations, Center for Naval Analysis, and cruise missile support activities.

AGM-84H SLAM-ER

The Standoff Land Attack Missile Expanded Response (SLAM-ER) is an air-launched, long-range cruise missile designed to attack fixed, high-value targets ashore. SLAM-ER incorporates an improved anti-surface warfare mode to attack ship targets in port or underway in the littoral. The missile combines the *Maverick* infrared seeker, an advanced ring laser gyro inertial navigation system, with an integrated multi-channel global positioning satellite system and improved "man-in-the-loop" control to allow precise target aim-point selection by the pilot. SLAM-ER incorporates folding planar wings, a reactive titanium-case warhead, and an advanced mission computer with new operational flight software that provides significant missile performance and pilot interface enhancements. In combination, these improvements allow F/A-18 aircraft to make precision strikes at ranges greater than 150 nautical miles with increased accuracy, lethality, and survivability. Additionally, the automated SLAM-ER mission-planning module in the tactical automated mission planning system is easy

to use and allows SLAM-ER missions to be planned in fewer than 30 minutes.

The baseline SLAM will continue to fulfill the Navy's requirement for a standoff outside area defense weapon until SLAM-ER achieves initial operational capability. SLAM-ER is currently completing operational evaluation; approval for full-rate production is expected in the spring of 2000. SLAM-ER has deployed with two carrier battle groups with interim flight clearances and was first employed in combat during enforcement of the Iraqi "no-fly" zone in November. SLAM-ER has continued to participate as one of three Navy pilot programs selected by the Office of the Secretary of Defense for program manager oversight of life cycle support.

Development of an automatic target acquisition capability for SLAM-ER (SLAM-ER+) is underway with flight-testing planned for 2000. SLAM-ER+ will provide aircrews with improved target acquisition and counter-countermeasure performance for target attacks in highly cluttered scenes and environmentally degraded conditions. Fleet release is expected in early 2001.

AERIAL TARGETS AND DECOYS

The Naval Aviation Systems Team (TEAM) procures and fields a wide range of target systems for the Navy, including subsonic sub-scale targets, missile targets, and full-scale targets to simulate and replicate enemy threat systems for the testing of weapon systems and fleet training. In 1999, the Naval Air Systems Command (NAVAIR) continued efforts to develop two new target systems, the designated Target 21 and Supersonic Sea Skimming Target (SSST) "Threat C" to simulate the next generation of missile threats. Target 21 will replicate the most advanced and stressing subsonic cruise missile threat. It received Milestone I approval in December to proceed into program definition and risk reduction. The SSST "Threat C", will replicate a supersonic sea-skimming anti-ship threat with a speed of Mach 2.5 at cruising altitudes down to 15 feet. The SSST "Threat C" program received Milestone II approval in July.

The TEAM also procures air-launched decoy systems for the Navy that provide realistic decoys of strike aircraft to deceive and saturate enemy integrated air defenses. In 1999, NAVAIR initiated efforts to improve the navigational accuracy of the improved tactical air-launched decoy system with a global positioning satellite-based system.

PIONEER UNMANNED AERIAL VEHICLE

During 1999, the program office initiated action to sustain *Pioneer* systems until the Vertical Take-off and Landing Unmanned Aerial Vehicle (VTUAV) replaces

A PIONEER UNMANNED ARIEAL VEHICLE

them. The Versatron 12DS combination electro-optics/infrared payload was successfully tested as a replacement for the two current *Pioneer* payloads. Delivery to the Fleet began at the end of the year. Flight testing of a common UAV automated recovery system was completed in November. Tactical control system and tactical control data link integration efforts are underway with planned flight testing in the summer of 2000. This integration effort is being used as risk reduction for the upcoming VTUAV development program. The integration and testing of the Modular Integrated Avionics Group (MIAG) is nearing completion, with the flight test planned for January 2000. Planned introduction of MIAG into the Fleet began in early FY00.

During FY99, *Pioneer* surpassed 20,000 total flight hours since the system was introduced in 1985. In FY99, *Pioneer* units flew a total of 2,247 hours, making deployments aboard USS *Austin*, USS *Cleveland*, and USS *Ponce*. *Pioneer* units supported a joint task force during counter-narcotics operations, which resulted in the apprehension of 438 illegal aliens and more than 6,000-lbs. of illegal substances worth an estimated $9 million. *Pioneer* units also supported Operations SOUTHERN WATCH, NOBLE ANVIL, and ALLIED FORCE. *Pioneer* units supported real-time bomb hit assessments following an air strike. Three *Pioneer* air vehicles were lost to hostile enemy action during Operation ALLIED FORCE.

VERTICAL TAKE-OFF AND LANDING TACTICAL UNMANNED AERIAL VEHICLE

The Vertical Take-off and Landing Tactical Unmanned Aerial Vehicle (VTUAV) program began in FY99. During January 1999, the Joint Requirements Oversight Council validated the VTUAV operational requirements; and the Assistant Secretary of the

Navy for Research, Development and Acquisition designated the program an Acquisition Category II program. Procurement of 23 systems will be required to meet initial requirements. Twelve systems will be distributed to the Navy, while the Marines will receive 11 systems.

Since program initiation, the Navy program office actively engaged in early contractor discussions in order to attain industry support during the development of procurement documentation. The program office conducted an industry day during March and hosted numerous "one-on-one" contractor sessions. The VTUAV web site, *http://uav.navair.navy.mil,* was established in October 1998 and permitted extensive use of electronic means to disseminate draft procurement information. The request for proposal was released on 31 August 1999 and was followed-up with a pre-proposal conference in September. Contract award is anticipated in the second quarter of FY00, which will support an initial operational capability date in FY03.

VERTICAL TAKE-OFF AND LANDING DEMONSTRATION PROGRAM

Since the successful completion of the land-based flight test phase during the summer of 1998, Bell Helicopter's *Eagle Eye* and Bombardier's *Guardian* Unmanned Aerial Vehicles (UAV) have moved forward in preparing for the UAV Common Automated Recovery System (UCARS) integration with land-based testing, as well as preparing for shipboard testing. The system performed as planned while validating critical land-based testing during a 22 November 1999 demonstration of an at-sea automatic take-off and landing using the CL-327 *Guardian*. Bell is completing integration efforts which will culminate with an at-sea demonstration in March 2000.

A PREDATOR UNMANNED AERIAL VEHICLE PREPARES FOR A SIMULATED NAVY AERIAL RECONNAISSANCE MISSION OFF THE COAST OF SOUTHERN CALIFORNIA

UNMANNED AERIAL VEHICLE TACTICAL CONTROL SYSTEM

During 1999, the Unmanned Aerial Vehicle (UAV) Tactical Control System (TCS) program continued to make significant technical and programmatic progress, satisfying its Acquisition Phase I exit criteria, and preparing for its formal Milestone II review.

The year began with the TCS operational requirements document being staffed for revalidation in support of the Milestone II review. In March, the Joint Requirements Oversight Council issued a memorandum reaffirming the TCS requirement and specifying system implementation levels for the Air Force's Medium Altitude Endurance (MAE) and Tactical Unmanned Aerial Vehicle (TUAV) programs. In May, agreement was reached with each service on the desired implementation path for their respective UAV systems. In August, the Director, Operational Test and Evaluation formally recommended that TCS be operationally tested in conjunction with operational test events for both the Air Force and Army UAVs. On the technical front, TCS completed a critical design review for Block 0 Baseline configuration. Block 0 development was directed at the *Predator* MAE and Army/Navy/Marine Corps *Outrider* Tactical UAV weapon systems. With the decision to allow the Army and Navy/Marine Corps to pursue separate tactical UAV airframes, TCS was realigned to support both programs. Block 1 and Block 2 TCS configurations were designated to support these efforts, with the TCS Systems Integrator (Raytheon) tasked with all system integration responsibilities.

A Level IV flight demonstration was conducted with the Army's *Outrider*; and land and sea-based Level II demonstrations were conducted as part of the Navy's vertical take-off and landing UAV technology demonstration effort. *Predator* air vehicles were used to conduct a significant Command, Control, Computers, and Intelligence (C^4I) connectivity test, wherein a TCS ground control station, controlling a *Predator* air vehicle and payload, transmitted data to the joint surveillance and target attack radar system common ground control station. Efforts continued to integrate the *Pioneer*, TCS, and the tactical common data link. This is being conducted as an important risk reduction initiative that will support the Navy/Marine Corps UAV program. Progress continued in defining the interfaces with numerous C^4I systems targeted to receive UAV data via TCS.

The TCS program made significant progress in the international arena. Working with the North Atlantic Treaty Organization (NATO) naval armaments group, the concept of UAV interoperability and data dissemination was advanced via the NATO project group's 35 international technology demonstration

program. NATO validated the common, interoperable, and data dissemination architecture represented by TCS. The United Kingdom and Canada accepted delivery of TCS prototype systems for test and concept of operations development. A TCS workstation was sent to Germany to conduct flight demonstrations with the SEAMOS vertical take-off UAV (a German naval drone that is being tested by the German Navy). Efforts were initiated with the Netherlands to conduct a human factor assessment of UAVs, TCS, and a new frigate class being procured. All of these efforts significantly advanced the Secretary of Defense's directive for increasing interoperability with our allies.

NAVAL AIR SYSTEMS COMMAND PROGRAMS

H-46 SEA KNIGHT

The H-46 *Sea Knight* medium lift helicopter is a vital element in Navy and Marine Corps operations. Modifications to improve safety and reliability and to enhance the *Sea Knight's* night vision and navigational capability continued in 1999, and will be completed in FY00. The installation of new rotor heads and upgraded transmissions has improved the safety and reliability of the flight and rotor systems, eliminating the requirement for rotor head safety inspections. Ninety percent of the H-46 fleet modifications incorporated these modifications at year's end. Another safety modification program, the replacement of old, unreliable utility hydraulic pumps with more reliable commercial off-the-shelf pumps, began being incorporated in early FY99. All H-46 aircraft will have new pumps installed by March 2000.

The night vision goggle heads-up display and ARC 210 radio are being installed concurrently with the integrated communication/navigation control system modification. These modifications are currently incorporated into 80 percent of the Fleet and are on schedule to be completed by the end of FY00.

F-5 TIGER

The F-5 *Tiger II* is a light weight, twin engine, supersonic fighter used by the Navy and Marine Corps at Naval Air Station Fallon, NV, and Marine Corps Air Station Yuma, AZ, in the adversary mission. Thirty-two single-seat F-5E and four F-5F aircraft have performed well since being introduced into this very demanding role in 1975. A strain survey and fatigue life assessment completed in 1998 indicated the aircraft could remain in service for another 15 years through FY15. This, combined with interest from the Chief of Naval Operations to continue the F-5 as the backbone of the adversary force, prompted the development of "Tiger 2015".

Tiger 2015 is a strategy developed to ensure the continued safe, reliable, and cost effective service of the aircraft to FY15 and beyond. It consists of a multi-faceted approach, combining a mix of component replacements, avionics upgrades, and additional testing and analysis to ensure the aircraft will reach the FY15 objective.

T-2 BUCKEYE

The T-2 *Buckeye* continues its long tradition of training naval aviators at Naval Air Stations Pensacola, FL, and Meridian, MS. In FY99, 191 Navy and Marine Corps students completed intermediate strike pilot training, and 20 students completed Advanced E-2/C-2 pilot training in the T-2s at Meridian. In addition, 202 Navy and Marine Corps students completed naval flight officer training on the T-2 at Pensacola. Two classes, comprised of a total of 71 students from the Navy, Marine Corps, Air Force, Army, and international services, were graduated from the Naval Air Test Pilot School at Patuxent River, MD, after completing spin and flight characteristics training in the T-2. Recent improvements in aircraft flight controls and ejection seats have enhanced the aircraft's handling and safety. Improvements to correct a long-standing deficiency in the T-2's ejection seat pan will be incorporated in FY00.

MARINE CORPS PERSONNEL FROM AN H-46 SEA KNIGHT ASSIST IN SEARCH AND RESCUE OPERATIONS DURING HURRICANE FLOYD

SEA KING

The versatile H-3 *Sea King* continues to provide cost effective and reliable search and rescue, utility, range support, and executive transport to the Fleet. Raytheon Corporation is in the final stage of completion on the first of four UH-3H aircraft modified for the executive transport mission. Three more H-3H aircraft are to be upgraded, replacing the aging VH-3A aircraft. This year, the UH-3H received the In-flight Blade Inspection System (IBIS), which provides an in-flight method of checking the main rotor blade. IBIS provides an enhanced level of safety for the Fleet by allowing the aircraft to fly continuously without shutting down and visually inspecting the blades.

SUPPORT/COMMERCIAL DERIVATIVES

The Support/Commercial Derivative Aircraft program office is a leader in Department of Defense efforts to maximize Commercial Off-The-Shelf (COTS) equipment. COTS equipment allows the Naval Aviation Systems Team to use proven commercial systems, which result in safe and affordable solutions. The program office is also a leader in implementing acquisition reform/performance-based specifications for its services contracts, taking full advantage of business practice and process improvements pioneered in the private sector. The program office manages 18 aircraft programs with a total of 774 aircraft.

The C-40A, manufactured by Boeing, is a Federal Aviation Administration (FAA)-certified, high-performance, fixed wing aircraft that will accommodate 121 passengers, 8 pallets of cargo, or a combination configuration consisting of 3 pallets and 70 passengers. The C-40A will be a one-for-one replacement for the aging C-9B/DC-9 aircraft currently flown by the Naval Reserves. The aircraft will provide long-range, high-priority logistical airlift in support of fleet activities. In 1999, the C-40A Integrated Product Team procured a fourth C-40A. Deliveries of the first four aircraft are anticipated in 2001. Funding for three additional C-40A aircraft has been included in FY00, FY02, and FY05 Navy budgets.

The next generation *Hercules* tanker, the KC-130J, incorporates state-of-the-art technology. The advanced features of the KC-130J will yield significant performance enhancements, improving the range and cruise ceiling by 40 percent and maximum speed by 21 percent. To date, seven KC-130J aircraft have been placed on contract; deliveries will begin in 2000.

During 1999, two UC-35C aircraft were delivered to the U.S. Marine Corps Reserve. The UC-35C is a FAA-certified, twin-engine jet aircraft that will provide transportation of high-priority personnel and cargo. FY00 Navy aircraft appropriation funding provided for two additional UC-35s. Funding has been included in the Navy Budget in FY02, 04, and 05 for three additional aircraft.

A SH-3H SEA KING HELICOPTER HOVERS OVER THE WATER TO RECOVER EXPLOSIVE ORDNANCE DISPOSAL TECHNICIANS PRACTICING INSERTION AND RECOVERY OPERATIONS

Eight CT-39G aircraft were modified/converted to T-39G aircraft for the Chief of Naval Air Training (CNATRA) during 1999. These aircraft are used to train flight officers at Naval Air Station Pensacola, FL. The conversion to the T-39G configuration consists of new instructor jump seats, new electronic horizontal situation indicators, improved intercom systems, a new auxiliary air conditioning system, and a new global positioning satellite system. Delivery of seven aircraft to CNATRA was completed in 1999; the last aircraft will be delivered in January 2000.

TACTICAL TRAINING RANGES

The Joint Tactical Combat Training System conducted environmental testing and demonstrated core-to-pod and pod-to-pod encrypted communications in October 1999. The system is scheduled for F/A-18 and F-14 flight-tests in March 2000. This system will provide real-time, rangeless air combat training, tactics development, and aircrew readiness assessments.

In March, the Navy awarded a contract for a Mobile Remote Emitter System (MRES) for the Naval Air Warfare Center, Patuxent River, MD, and the Pacific Missile Range Facility, CA. MRES is a high-power electronic warfare simulator system capable of illuminating aircraft, ships, and various other

signal platforms. Using a combat electromagnetic environment simulator, the system can be programmed with up to 64 emitter signals and has frequency coverage of 2 to 18 gigahertz.

The Office of the Secretary of Defense Test and Evaluation Director, Test Systems Engineering and Evaluation funded the Tactical Aircrew Combat Training System program to develop and demonstrate a tactical air-launched decoy capability. The decoy will enhance the electronic warfare capability of the air combat training ranges. The uniqueness of the program is its use of the Air Combat Environment Test and Evaluation Facility, which combines the electronic warfare integrated systems test laboratory, offensive sensors laboratory, and manned flight simulator to create an electronic warfare test environment.

The AN/FSQ-T22, an electronic combat environment analyzer/simulator, successfully completed acceptance testing in May 1999 at Naval Air Station Whidbey Island, WA. This device provides a multi-signal electronic combat environment to train EA-6B crews. The system came in under cost and offers the Navy EA-6B community an extremely valuable training tool.

The Carderock, MD, division of the Naval Surface Warfare Center delivered an upgraded autonomous mobile periscope system to the Pacific Missile Range Facility. This system is an unmanned, submersible vehicle that emulates a submarine running at periscope depth, providing a target for use in periscope detection training for aircrews.

AVIATION TRAINING SYSTEMS

The Aviation Training Systems program team provides life cycle acquisition management of naval aviation training systems. It is the single point of contact to the Office of the Chief of Naval Operations for the Navy's long-range training systems acquisition planning and policy, research and development activities, and technology insertion.

An important milestone for naval aviation occurred during 1999 with the delivery of the flight training system for the V-22 *Osprey.* The aviation training systems office oversaw the delivery of the V-22 operational flight trainer and cockpit procedures trainer to Marine Corps Air Station New River, NC, three months ahead of schedule. In addition, the program office delivered training systems designed to increase aircrew/operator training capabilities including: T-45 Operational Flight Trainer; T-45 Instrument Flight Trainer; UH-1 Aircrew Procedures Trainer; EP-3 Mission Avionics System Trainer; P-3C Weapon System Trainer; and an E-2C Weapon System Trainer for France. Additionally, two Parachute Descent Virtual Reality Trainers, one Unmanned Air Vehicle Weapon Systems Trainer, and 214 desktop aviation multi-purpose training systems were also delivered.

The Aviation Training Systems team delivered 19 Tactical Operational Preview Scene (TOPSCENE) mission rehearsal systems to Department of Defense activities and supported military operations in Kosovo by providing 8 TOPSCENE systems, a mini-database generation facility, as well as 6 personnel. The systems increase aircrew training capabilities by raising warfighter confidence and significantly improving their target acquisition capability.

Aviation Training Systems supported maintenance training through delivery of an AH-1W engine "remove and replace" trainer. Additionally, program managers delivered computer-based training courseware and hardware for the F-14A/B/D to the maintenance training group detachments. Existing F-14 maintenance training systems received incorporation of the digital flight control system, global positioning satellite system, and low-altitude navigation and targeting Infrared for night. A landing signal officer trainer visual upgrade was also incorporated into the F-14 maintenance training system. In addition, the Training Systems team delivered a transportable training technology demonstrator to the Fleet at the Naval Air Pacific Repair Facility in Atsugi, Japan.

NAVIGATION SYSTEMS

The Navigation Systems program office manages the acquisition, integration, and installation of navigation equipment and systems on Navy, Marine Corps, and Coast Guard platforms. The Global Positioning Satellite (GPS) system is a space-based position, velocity and time distribution system that provides

VADM BOWMAN AND STAFF RECEIVE COMPOSITE REPAIR CAPABILITY BRIEFING DURING A VISIT TO THE NAVAL AIR PACIFIC REPAIR FACILITY ON OKINAWA, JAPAN (SEPTEMBER 1999)

AN/TSQ-216 – REMOTE LANDING SITE TOWER

worldwide coverage, supports an unlimited number of users, and provides a common grid that allows Command, Control, Communication and Intelligence (C ^{4}I) interoperability among the services.

In 1999, formal GPS integration tests were completed and installation began to update the E-2C and systems on the P-3C, EA-6B, F-14B, C-20D, T-34C, T-39N, and CT-39G. Systems for the RC-12F/M, F/A-18A/B and MV-22B are in formal testing. A total of 566 fully integrated GPS installations were completed in 1999. Over 60 percent of Navy, Marine Corps, and Coast Guard aircraft are now equipped with GPS.

The growing importance of GPS for naval warfighting operations and the key role that GPS plays in *Joint Vision 2010* and network centric warfare prompted the Assistant Secretary of the Navy for Research, Development, and Acquisition and the Office of the Chief of Naval Operations to establish a committee to investigate GPS vulnerability. The Naval Advisory Research Committee, confirmed GPS vulnerabilities and recommended that the Navy develop a program to reduce or eliminate them. The Navy established the Naval Navigation Warfare program, which identified an initial list of naval aircraft and ships to receive the first anti-jam GPS antennas starting in 2000.

AIR TRAFFIC CONTROL AND LANDING SYSTEMS

Air Traffic Control and Landing Systems (ATCALS) are a vital element of the Navy and Marine Corps aviation operations, providing safe and positive control of aircraft during take-off, approach, and landing operations. In addition to surveillance radar, precision approach landing systems, and communications and navigational aids, the ATCALS program provides a wide range of combat identification systems and peripherals to enhance the Warfighter's ability to distinguish between threat and non-threat aircraft.

In FY99, a number of programs were initiated to support the Warfighter. First articles of the AN/TSQ-216 remote landing site tower were delivered to the Naval Air Technical Training Center in Pensacola, FL, and initial operational capability will be established in 2000. The program office completed delivery of 17 AN/TPN-22 modulators. Technicians installed Tactical Air Navigation (TACAN) engineering change modifications in 58 of the AN/TPN-30(A) Marine remote area approach and landing systems during 1999. The Marine Corps took delivery of one AN/TRN-44 tactical 135 Hertz TACAN shelter modification in August 1999.

The joint Federal Aviation Administration/Department of Defense National Air Space Modernization (NASMOD) program will replace obsolescent, unsustainable air traffic control systems with modern technology. New equipment includes digital airport surveillance radar, the defense advanced automation system display and processor, the enhanced terminal voice communications switching system, and the visual information display system.

The enhanced terminal voice communications switching system obtained a full-rate production go-ahead. Developmental and operational testing are

being conducted on the remainder of NASMOD equipment during FY00. Limited rate initial production decisions on the digital airport surveillance radar and defense advanced automation system are expected in January 2000 and on the visual information display system in March. Full-rate production (Milestone III) decisions on these systems are scheduled for January 2001.

AIRCRAFT LAUNCH AND RECOVERY EQUIPMENT

The Aircraft Launch and Recovery Equipment program provides life cycle acquisition management for all Navy and Marine Corps aircraft launch and recovery systems and equipment. This includes responsibility for the development, test and evaluation, acquisition, and readiness improvements for catapult, arresting gear, helicopter landing systems, visual landing aids, wind measuring systems, aviation marking and lighting installed on ships, and expeditionary airfield equipment.

Significant milestones achieved in 1999 will provide advanced technology systems to the Warfighter. Milestones include the Improved Fresnel Lens Optical Landing System (IFLOLS) which received low-rate initial production authority in April for 12 shipboard systems. IFLOLS provides pilots with enhanced recovery glide slope information at a range of 1.5 nautical miles.

The Long-Range Lineup System is a new device that provides pilots with more accurate recovery lineup information at a range of 6.66 nautical miles. This system received production release in June.

AN F/A-18C HORNET IS READIED FOR LAUNCH ON THE USS ENTERPRISE (CVN 65)

The Integrated Shipboard Information System provides real-time air operations information to multiple areas aboard the carrier, replacing the current grease boards with integrated electronic displays. This shipboard information system went into production in August.

The Electromagnetic Aircraft Launch System (EMALS) program awarded two program definition and risk reduction phase contracts in December. The EMALS program will develop the next generation of catapult for installation on the Aircraft Carrier Nuclear Experimental (CVNX).

AIRCREW SYSTEMS

The Aircrew Systems program provides life cycle acquisition management for aviation life support systems. These systems protect aircrews from death and injury from directed energy weapons, chemical/biological/radiological agents and fallout, ballistic projectiles, temperature extremes, heat and fire, low-concentration oxygen environments, emergency egress high-dynamic, or high-gravitational forces. Through the use of acquisition initiatives, the Aircrew Systems program expedited the introduction of life support systems into the Navy and the Marine Corps' fixed and rotary wing aircraft inventory; reduced costs; and promoted inter-service commonality. These initiatives include the use of non-development items and joint, tri-service, and North Atlantic Treaty Organization/allied cooperative ventures. Through a combination of logistics engineering change proposals, value engineering change proposals, small business innovation research initiatives, and industry partnering, the program office identified $39 million in savings during 1999. Additionally, the program office secured funding for three FY00 affordable readiness initiatives, and work progressed on 20 prior affordable readiness initiatives with a net potential cost avoidance of $60 million.

The Navy Aircrew Common Ejection Seat (NACES) program delivered the 1,000th production seat during 1999. The NACES program Pre-Planned Product Improvement (P3I) programs for accommodating a broader aircrew weight range completed testing and received approval for engineering change orders. Other NACES P3I efforts include an upgraded electronic sequencer that improves performance and lowers total ownership costs. The office began an initiative to improve the AV-8B *Harrier* ejection seat during the year.

During 1999, the Aircrew Systems program exercised its their first production option to procure a state-

of-the-art non-combat survival radio to replace the aging PRC-90. This new radio will incorporate using a Russian satellite system with an American Search and Rescue Satellite Aided Tracking, permitting worldwide location of downed aircrew members within a radius of 100 meters. Initial fleet deliveries will commence in June 2000.

MATURE AND PROVEN AIRCRAFT SYSTEMS

Working exclusively with security assistance cases for foreign military unit governments, the Mature and Proven Aircraft Systems program has cognizance over the A-6E *Intruder*, the A-7 *Corsair II*, the S-2 *Tracker*, and a military variant of the *Cessna* 337. Additionally, repair of cases are managed for the A-7 *Corsair II* and T-2 *Buckeye* aircraft and associated TF-41 and J-85 engine components to ensure foreign customers receive timely and cost effective component repair. This program currently manages and supports more than 60 foreign military sales cases in more than a dozen countries offering affordable, supportable, and capable combat aircraft alternatives to those countries that might not otherwise be able to afford premier tactical aircraft.

During 1999, more than 100 aircraft in the Hellenic Air Force and 18 aircraft in the Royal Thailand Navy were successfully supported. Two A/E37T-14 engine test cells were installed, calibrated, correlated, tested, and made operational for both customers.

To support our customer's out-of-production aircraft in future years, repairable program management efforts have been aggressive—seeking alternative, cost effective repair solutions. Initiatives, such as the transition of all A-7 hydraulic and electrical capabilities from the Naval Aviation Depot in Jacksonville, FL, to the Naval Surface Warfare Center, Crane, IN, have occurred to accommodate changes in commercial and depot workload priorities.

In a cooperative effort with Northrop Grumman, new business initiatives for the A-6E *Intruder* have included an informational display at the Paris Air Show and embassy briefings to provide potential customer countries formal presentations on the capabilities, supportability and affordability of this versatile weapon system. In addition, the transition of the S-2T from the Taiwan Air Force to the Taiwan Navy in July 1999, has also added new business support opportunities.

MANUFACTURING AND RESOURCE PLANNING

The Department of Defense Manufacturing and Resource Planning program provides the services with commercially available software tools that enable improvement of organic maintenance, repair, and overhaul processes. Installation of this software has occurred at the three naval aviation depots, two Marine Corps logistics bases, and the Air Force Aircraft Maintenance and Regeneration Center, resulting in increased material inventory accuracy, reduced material procurement, and decreased turnaround time on inducted work. Additional installations at Army and Air Force sites are anticipated in the future.

AVIATION SUPPORT EQUIPMENT

The Consolidated Automated Support System (CASS) provides the Fleet with the capability to test and repair electronic equipment, both ashore and afloat. During 1999, Naval Air Systems Command (NAVAIR) purchased 45 CASS stations and installed 57 at various fleet, defense business operating fund and foreign military sales sites. More than 375 CASS stations (approaching 55 percent of the inventory objective) have been fielded. Additionally, 62 new CASS test program sets were delivered to the Fleet this year. The program reached a major milestone with the acceptance of the 400th CASS station at Naval Air Station Oceana, VA.

The reconfigurable, transportable CASS consists of portable cases that interconnect for rapid deployment. The cases include commercial instruments that provide performance similar to instruments in a full-sized station. The advent of Verabus module Europe extension instruments technology and increasingly available commercial off-the-shelf assets has provided the opportunity to downsize the current CASS into the transportable version capable of meeting the operational requirements of the Marine Corps and U.S. Special Operations Command for the V-22 aircraft. During 1999, a cooperative agreement team consisting of NAVAIR, Lockheed Martin, and Indra completed the design and fabrication for the start of software integration. NAVAIR also initiated contracts for two prototype units for design, manufacture, assembly, and testing. Prototype testing will verify results of engineering studies, analysis, demonstrations, and relevant logistics impact.

During 1999, NAVAIR delivered more than 578 pieces of 5 end items (of common ground support equipment) to the Fleet. This equipment consisted of 260 air data test sets, 185 common rack and launcher test sets, 63 floodlight carts, 36 hydraulic component test stands, and 34 1,500-lb. utility cranes.

INTERNATIONAL PROGRAMS

International Programs supports the Fleet and 53 foreign governments worldwide through daily involvement with initiatives ranging from evaluating

A ROYAL NORWEIGAN AIR FORCE P-3C, WHILE UNDERGOING AN UPDATE IMPROVEMENT PROGRAM, CONDUCTS AN ALE-47 FLARE JETTISON AT PATUXENT RIVER NAVAL AIR STATION

foreign products for potential Fleet use via the Foreign Comparative Test (FCT) program, to selling existing U.S. Government products and services through the Foreign Military Sales (FMS) program.

The FCT program is an acquisition-based program that helps program managers more easily evaluate state-of-the-art, non-developmental foreign products against unsatisfied requirements. FY99 acquisitions resulting from FCT projects include 100 MA-31 anti-ship missiles from Russia and 96 units in Lot II of the F-14 Digital Flight Control Systems from General Electric Company/Marconi in the United Kingdom.

The FMS office represents the bulk of the programs' international involvement. FMS sales for 1999 continued an upward trend. FY97 had 111 cases valued at $454 million; FY98 had 136 cases valued at $662 million; and FY99 had 121 cases valued at $1,287 million. Overall, the Naval Aviation Systems Team has 1,537 open FMS cases (involving 20 program offices) valued at $30 billion. Of this, $23 billion is material/service complete, leaving $7 billion for current and near-term procurement actions. The Fleet enjoys reduced unit costs, more reliable deliveries, and increased interoperability with our allies as a result of FMS.

AIR COMBAT ELECTRONICS

Major initiatives of the Air Combat Electronics program range from the development of state-of-the-art, open-architecture systems to the installation of mandated safety critical aircraft systems. During 1999, the program delivered 4,700 production items with a 97 percent on-time delivery record. Following the installation of Crash Survivable Flight Incident Recorders (CSFIRs) in all passenger aircraft, system integration of CSFIRs into F/A-18C/D aircraft began and installations are expected to occur in FY00.

The Advanced Mission Computer and Display completed necessary critical design reviews toward achieving prototype delivery goals in FY00. The system was expanded to include the T-45, with AV-8B and F/A-18 as lead platforms.

Program managers continued to meet mandates for installing Traffic Alert and Collision Avoidance Systems (TCAS) that provide aircrews sound and visual warnings to prevent mid-air collisions. In FY99, all components achieved Federal Aviation Authority certification, and TCAS installation began on KC-130 aircraft.

Installations of the Ground Proximity Warning System, a safety warning system to alert pilots to impending controlled flight into terrain, has been completed in 71 C-130, 62 H-53, and 37 H-46 aircraft.

The new Identification Friend or Foe program was initiated to produce a new Mode S transponder that will replace the APX-100 and APX-72, becoming the new standard system for naval aviation.

The Tactical Aircraft Moving Map capability uses commercial technology and National Imagery and Mapping Agency standard data products. Following a successful operational assessment, program managers awarded their first contract for 30 systems to meet F/A-18E/F Lot XXIII deliveries.

All versions of the ARC-210 radio are in production, providing line-of-sight and beyond line-of-sight communications capability to Navy, Air Force, and Army aircraft, ships, and ground vehicles.
An engineering change proposal was awarded and hardware was delivered to provide military aircraft with 8.33 channel spacing capability to meet International Civil Aviation Organization flight safety requirements. The Air Force's C-17 is the first aircraft to complete testing and operate with beyond line-of-sight communications capability. The KC-130 has begun integration and testing of the same capability.

The Embedded Global Positioning Satellite/Inertial Navigation system (EGI) successfully completed operational test and evaluation on the F-14B, EA-6B and S-3B. Initial operational capability for S-3B and EA-6B systems is planned for early 2000. Upgraded EGI with altimeter functions for the AH-1Z and UH-1Y also began development. The fielded AH-1W EGI demonstrated a significant reduction in per flight hour costs over older systems. Joint Direct Attack Munitions-compatible EGI software was developed for the next F-14B fleet software release.

APPROACH CONTROL AT PATUXENT RIVER NAVAL AIR STATION

A STUDENT NAVAL AVIATOR PREPARES FOR TAKE-OFF IN A T-45 FROM USS GEORGE WASHINGTON (CVN 73) DURING CARRIER QUALIFICATIONS (MAY 1999)

THE F/A-18E SUPER HORNET IS A MULTI-MISSION STRIKE FIGHTER FOR THE 21ST CENTURY

Improving Responsiveness to the Warfighter

OVERVIEW

As recent history has shown in places like Kosovo, Southwest Asia, and around the world, naval aviation will continue to play a key role in carrying out the national strategy. Working within the confines of a budget that is expected to remain flat, the Naval Aviation Systems Team (TEAM) will be challenged to prepare for the future while meeting the daily operational needs of our Warfighters, who face increased operations with an ever-aging inventory of weapons systems. The pressure to maintain operational capability, while struggling to address necessary recapitalization and modernization issues, is the genesis of the TEAM's affordability and readiness initiatives.

To address these issues, the TEAM crafted its 2000-2005 Strategic Plan to focus on how we will support the Warfighter in achieving naval aviation's part in the national strategy. Our goal is to meet the future needs of the Navy and improve warfighter readiness, effectiveness, and satisfaction by streamlining our processes, reducing costs, and developing a highly capable, team-focused work force. The Warfighter is our paramount concern, and meeting the needs of the operational forces is intrinsic to our strategy and the foundation of our very existence.

To emphasize the inter-relationship of our goals and strategies, we have outlined our readiness and cost reduction efforts within the TEAM's four strategic goals: Warfighter, People, Affordability, and Processes. In this way, the TEAM's Annual Report will serve as a companion document to the TEAM's Strategic Plan and will function as a means to report progress toward meeting these goals in the years to come.

WARFIGHTER

The overarching impetus behind the Naval Aviation Systems Team (TEAM) Strategic Plan is supporting our operational forces. Our number one goal is to increase warfighter readiness, effectiveness, and satisfaction. The

CREW MEMBERS OF USS THEODORE ROOSEVELT (CVN 71) REFERENCE PRESIDENT THEODORE ROOSEVELT: "SPEAK SOFTLY AND CARRY A BIG STICK . . . " (SEPTEMBER 1999)

challenge is to meet the demands of today's high-tempo operational environment while preparing for the future. The mounting costs of maintaining an aging aircraft inventory in a fiscally constrained environment hampers efforts to invest in new aircraft systems or improve existing weapons systems.

The TEAM has attacked this problem by studying internal processes. Working closely with fleet customers, we are striving to better understand the needs of the Warfighter, and have redesigned processes to increase reliability and decrease maintenance demands.

AVIATION MAINTENANCE AND SUPPLY READINESS

Balancing today's operational requirements while ensuring we are properly poised and ready to meet the threats of the future is becoming increasingly difficult. Maintaining deployed readiness without adversely impacting non-deployed readiness is a tenuous balance that requires a thorough understanding of the Navy's deployment cycle.

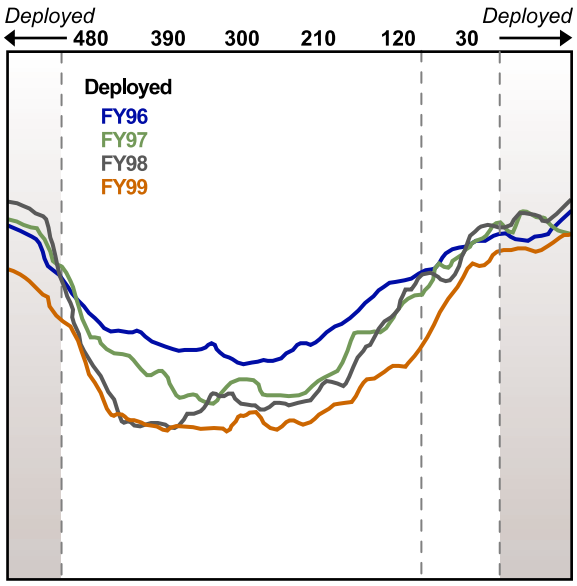
Following a deployment, units enter the Inter-Deployment Training Cycle (IDTC). During early stages of the IDTC, readiness degradation is expected as ships and aircraft undergo maintenance, and crews turn over. As units progress through the IDTC, readiness should steadily improve as maintenance is completed and training opportunities increase. In the latter stages of the IDTC, units hone their warfighting skills by participating in exercises designed to ensure full combat readiness prior to deployment.

CNO CONGRESSIONAL TESTIMONY ON READINESS

In October 1999, the Chief of Naval Operations (CNO) summarized the state of operational readiness in Congressional testimony. He indicated that in 1998, the Navy's principal concerns were with the non-deployed forces in the inter-deployment training cycle. The so-called "bathtub" chart *(see figure)* best illustrates these concerns. Although the bathtub chart focuses on non-deployed air wing readiness, it is believed that the data is indicative of the entire force. Compared to January 1998, the "bathtub" has grown deeper and steeper (depth is best expressed in terms of time).

Two fundamental elements are driving the depth of the "bathtub": personnel shortfalls and equipment readiness. The Navy is making headway in reducing the shortage of personnel at sea. To improve equipment readiness, which in this case deals with the material condition of our ships and aircraft, the Navy has increased funding for maintenance and improved metrics. These metrics will be utilized to better identify

NON-DEPLOYED AIR WING READINESS "BATHTUB CHART" (DAYS PRIOR TO DEPLOYMENT)



requirements and address the maintenance concerns expressed by fleet commanders.

The CNO reported that while concerns remain, some of the key readiness metrics are showing improvement—including decreases in aircraft shortages, cannibalizations, and maintenance backlogs, and increases in the percent of aircraft available. The net result was that 140 more aircraft were available to the Fleet in 1999 than were available at the end of FY98.

AVIATION MAINTENANCE AND SUPPLY READINESS ACTION TEAM

Despite these improvements, the Navy remains concerned with other key readiness indicators. As part of a Navy-wide effort to increase understanding of causal factors and to effect improvements, the Naval Air Systems Command (NAVAIR) continues to play a central role in the CNO's Aviation Maintenance and Supply Readiness (AMSR) study group. The AMSR team was established in 1998 in response to rising readiness concerns. At that time, representatives from the Fleet and the NAVAIR Naval Aviation Systems Team were tasked with identifying specific actions that would reduce overall aviation maintenance and supply costs, increase readiness, and provide systemic improvements to support naval aviation in the 21st century.

As the study group identified issues and formulated recommendations, five primary focus areas emerged: Metrics; Integrated Logistics Support (ILS); Maintenance and Supply; Personnel; and Funding and Cost Management. Within these five areas, the study group identified 18 individual issues.

NAVAIR has taken the lead in nine of these issues. These are: customer focused metrics; ILS metrics reporting improvements; ILS moving away from plane-side; ILS health maintenance; NAVAIR/naval aviation depot core workload; aviation configuration management; aircraft and engine shortfalls; cannibalization; and aviation depot-level repairable costs and reliability.

CURRENT STATUS

The Aviation Maintenance and Supply Readiness (AMSR) team has challenged NAVAIR program teams to work closely with the Fleet to identify both readiness and cost issues. A significant accomplishment of the AMSR study initiative has been the development of standardized metrics, which describe significant readiness and cost performance by platform. The analysis and measures resulting from the issues identified, and the specific improvement actions being taken to solve problems are briefed monthly to senior aviation leadership, thereby promoting the visibility and resolution of issues at the highest levels.

The importance of the entire logistics system is becoming increasingly obvious as the AMSR team explores the contributing factors leading to current readiness. To meet the needs of our Warfighters, the logistics system and its 10 Integrated Logistics Support (ILS) elements must be understood and brought into balance with the proper timing and amount of resources. The AMSR initiative has been a leading force in highlighting these issues and integrating what occurs at the program level with system-wide initiatives.

The AMSR initiative continues to serve as an important forum for articulating naval aviation budget requirements as they apply to readiness and increasing communications among Navy leadership and the operating forces.

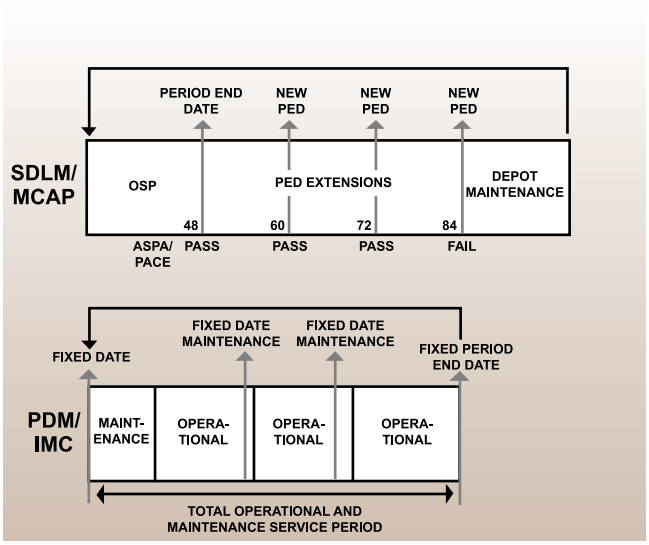
For a comprehensive look at the progress of AMSR initiatives, including top-level metrics and reports on cannibalization, flight hour costs, and mission capable rates (with drill-down capability by air wing, squadron, and type/model/series), visit the AMSR web site at *http://www.nalda.navy.mil/amsr*.

INTEGRATED MAINTENANCE CONCEPT AND RELIABILITY CENTERED MAINTENANCE

Reducing maintenance down time is fundamental to our readiness improvement efforts, and the Naval Aviation Systems Team (TEAM) is committed to implementing an Integrated Maintenance Concept (IMC) for naval aircraft. The IMC process consists of three fundamental tenets: fixed operating service periods that allow better forecasts of aircraft condition, availability, and maintenance requirements; Reliability Centered Maintenance (RCM) analysis, a preventive maintenance program that identifies problems and allows them to be repaired before components need to be replaced or cause collateral damage; and consolidation of maintenance tasks to minimize duplication of maintenance efforts. RCM is key to the TEAM's IMC program. RCM-based analysis is used to plan preventative maintenance for each platform to ensure that these tasks are performed at the right location and interval, and by the appropriate maintenance facility. IMC ensures the highest degree of availability and readiness at the lowest overall life cycle cost. Using RCM to proactively analyze and adjust maintenance and inspection cycles, we have already experienced a 30 percent reduction in annual out-of-service time with E-2C and F/A-18 aircraft. Further savings are expected as we expand RCM to include additional platforms. Applied to aviation support equipment, RCM savings have been even more dramatic. On three pieces of support equipment, an aircraft tow tractor, a portable air conditioning unit, and a portable electric power plant, program managers recorded a 78.8 percent average reduction in scheduled maintenance labor-hours following RCM analysis.

Our fleet customers are an integral part of the RCM process. Fleet operators and maintainers have the knowledge and experience with our aircraft and equipment in the operational environment. RCM uses this expertise to build a technically valid maintenance program that shares ownership of the maintenance process between the warfighting customer and the TEAM. RCM offers quantifiable savings by reducing scheduled maintenance, decreasing maintenance consumables, and reducing the amount of hazardous material disposed.

IMC/RCM



BATTLE GROUP INTEROPERABILITY

Future warfighting scenarios will be widely dispersed and harder to predict; and maintaining dominance will require increased speed, accuracy and agility. The key factor is integration, maximizing the effectiveness of individual platforms by linking them into a networked striking force. This is a complex problem that once solved will enable a quantum leap in the performance of our operating forces.

Since the fall of 1998, the Naval Aviation Systems Team (TEAM) has been working with our sister System Commands, the Naval Sea Systems Command, and the Space and Naval Warfare Systems Command to improve interoperability among Navy and joint platforms. The TEAM's focus is resolving battle group interoperability issues associated with aircraft, air weaponry, and related support systems, such as the Tactical Aviation Mission Planning System. To date, the TEAM has provided configuration management and systems engineering expertise to help 10 battle groups deploy interoperable systems.

NETWORK CENTRIC WARFARE

During 1999, the Naval Aviation Systems Team (TEAM) also worked with Chief of Naval Operations staff (OPNAV) help define naval aviation operational requirements for the shift from platform to network centric warfare. The network centric architecture gives every element of the battle group the ability to access and display sensor information from all sources, increasing battlefield awareness and providing flexibility in defending against all threats.

While full network centric warfare capability is 15 to 20 years away, the TEAM is collaborating with OPNAV, other system commands, the Navy Warfare Development Command, and the Fleet to develop a new capability that demonstrates how ships and aircraft interact in a network centric environment. Referred to as time critical strike, the capability will enable the Warfighter to rapidly respond to new threats on the battlefield, such as successfully disabling a mobile scud launcher. The first test of the new capability will be during Fleet Battle Experiment Hotel in September 2000.

NAVAIR will reach its first milestone in building network centric capability in February 2000 when a new link between nine East and West Coast research, development, test, and evaluation facilities will be tested. Expected to be fully on-line in July 2001, the network will be able to transmit real-time classified video, voice, data, telemetry and time-space-position information to support weapon systems testing and warfighting exercises. The enhanced capability means the TEAM will be able to test new systems just as they are flown in the field—in an integrated, real-time environment through the use of live events, simulators, and range assets.

TECHNICIANS MONITOR SPECIALIZED INFORMATION SYSTEMS WHILE PARTICIPATING IN NATO OPERATION ALLIED FORCE ABOARD USS THEODORE ROOSEVELT (CVN 71) (MAY 1999)

FLEET BATTLE EXPERIMENTS

During 1999, the Naval Aviation Systems Team (TEAM) began earnestly working with the Navy Warfare Development Command to identify and develop new technologies that the Fleet will need in the next 10 to 20 years. This effort is largely supporting naval aviation's transition from platform to network centric warfare.

The collaboration enhances the TEAM's long-standing participation in Fleet Battle Experiments, which demonstrate nearer-term solutions (5 to 10 years out) for fleet application. During 1999, the TEAM provided full-time systems engineering support for Fleet Battle Experiment Echo (with the Third Fleet in exercises off the California Coast) and FoxTrot (with the Fifth Fleet in the Arabian Gulf). Additionally, TEAM members developed scenarios to conduct precision sensor-to-shooter live-fire engagements, and support real-time targeting and global positioning satellite-jamming exercises.

These experiments demonstrated how naval surveillance assets might support Time Critical Strike, such as redirecting joint strike assets from a Navy-led Joint Air Operations Center. In the coming year, the TEAM will further develop these concepts in Fleet Battle Experiments Golf and Hotel and continue to pursue a joint Time Critical Strike operating environment by providing systems expertise to the Air Force.

TEAM representatives also participate on the Office of the Chief of Naval Operation's Strategic Study Group to define Navy concepts for up to 30 years in the future.

PEOPLE

As we move into the 21st century, there will be increased emphasis on the interconnectivity of our warfighting systems as well as our infrastructure assets. The rapid evolution of technology, changes in how employees work, and the unpredictability of the defense environment will require a work force that is able to manage knowledge resources efficiently and dynamically, across the Naval Aviation Systems Team (TEAM).

People—our greatest resource—must be given the tools and the opportunities to meet the demands of this ever-changing environment in order for the TEAM to continue to provide quality products and services for our nation's defense. To this end, leadership established a goal to attract, develop, and care for a diverse, team-focused work force capable of meeting the current and future needs of the Navy.

As a first step toward achieving this goal, leadership created a TEAM People Council in December 1999. Comprised of senior leadership and labor representation, the People Council will oversee the implementation of several employee-related initiatives focused on work force composition and sizing, knowledge management, and quality of work life. Although most of these initiatives were in the early planning stages at year's end, momentum and enthusiasm for this goal's intent spurred early progress.

WORK FORCE COMPOSITION AND SIZING

Over the past 10 years, the TEAM has undergone a dramatic transformation from an organization of more than 57,000 employees to fewer than 31,000 today. We are a lean organization that must now focus on ensuring we have the right skills and organizational knowledge to meet the needs of tomorrow's Warfighter. In the ensuing months, the TEAM People Council will concentrate on baselining the current composition of work force skills and identifying the Command's mission-related requirements over the next five years. This information will be used to adjust the size and skills of our work force through hiring, training, attrition, and long-term career development programs. Additionally, the People Council will complement a diversity action plan to encourage fair and equitable hiring, promotion, training, and developmental opportunities throughout the TEAM.

KNOWLEDGE MANAGEMENT

The work force skills baseline will also be used to develop methods and tools for documenting, sharing, and applying knowledge to best address emerging requirements with fewer resources. Capturing and transferring organizational know-how, experience, and history is perhaps our most critical near-term initiative, given that 30.5 percent of the work force will be eligible for retirement within five years. Effective retention and management of our unique knowledge will allow us to maintain the quality of our products and services as people retire, and will ultimately help reduce the cost and time associated with delivering those products to the Warfighter.

QUALITY OF WORK LIFE

In January of 2000, a Quality of Work Life (QWL) team was formed to improve the quality of work life of our military and civilian personnel. The team has identified a series of potential initiatives that can be implemented quickly to improve QWL for employees, including holding informal lunch sessions between leadership and employees, giving informal awards to promote team spirit and corporate unity, hosting employee appreciation events, and promoting the use of mission-related perks (e.g., simulator time, carrier trips). In the spring of 2000, the QWL team plans to administer an assessment to gauge employee satisfaction and employee priorities for future QWL actions, and then use that feedback as the foundation for future actions.

The TEAM depends on its people to meet the demands of today's rapidly evolving work environment. The People Goal is designed to prepare our employees to meet this challenge with the proper training, motivation, knowledge, opportunities, and working environment to efficiently maintain our unique end-to-end support of naval aviation weapons systems.

NADEP CHERRY POINT SHOP SUPERVISOR GEORGE NEWKIRK DISCUSSES HELICOPTER TRANSMISSION REPAIR PROCEDURES WITH AIRCRAFT MECHANICAL PARTS WORKER ROBERT ALVARADO

TOTAL OWNERSHIP COST/ AFFORDABLE READINESS

Since the Naval Air Systems Command (NAVAIR) began implementing affordable readiness, additional guidance and direction on Total Ownership Cost (TOC) reduction has been released by both the Department of the Navy and the Department of Defense. In May 1998, the Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN(RD&A)) directed the formulation and implementation of formal TOC reduction efforts for all Department of Navy programs, regardless of acquisition category designation. TOC, as defined in the ASN(RD&A) Strategic Plan, includes "all costs associated with the research, development, procurement, operation, logistical support, and disposal of an individual weapon system–including the total supporting infrastructure that plans, manages, and executes that weapon system program over its life cycle." Further, ASN(RD&A) required the establishment of formal cost baselines, reduction objectives and goals, and thresholds.

This is a complex effort that requires an integrated approach involving stakeholders from the Fleet, requirements community, acquisition managers, comptroller organizations, and others. With participation of the appropriate stakeholders and active participation of senior leadership, NAVAIR's opportunities for success will be maximized. In support of this strategy, the development and implementation of TOC plans for each and every naval aviation program has been paramount. At year's end, most programs had plans in place and the vast majority of the program teams were pursuing efforts and initiatives to reduce TOC. We will continue to ensure aggressive TOC goals have been included and each program is executing their plan as envisioned. However, it must be understood that critical investment dollars continue to remain a concern for most program teams.

With heavy emphasis placed on reducing total ownership and life cycle support costs, various sponsors have established a number of investment mechanisms. The most notable programs are the Cost Reduction and Effectiveness Improvement (CR&EI) from ASN(RD&A), Reducing TOC from DSAC, Logistics Engineering Change Proposals (LECP) from Naval Supply Systems Command, Commercial Operating and Support Savings Initiative (COSSI) from DoD, and the Operations and Maintenance, Navy Set-Aside for Affordable Readiness Initiative (ARI) by NAVAIR. These investment mechanisms are designed to fund initiatives that will reduce life cycle costs in the out years. These investment resources will be made available in the next budget execution year. Each of these investment mechanisms has published calls for initiatives at various times during the year and also requires NAVAIR to review, approve, and/or endorse the initiatives. The NAVAIR Affordable Readiness Set-Aside has been the major contributor and represents approximately 86 percent of the TOC reduction effort.

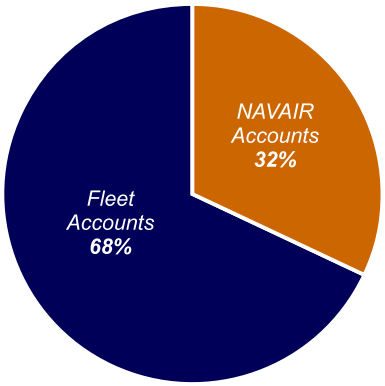
TOC Reduction
Cumulative Number of Initiatives

	SUBMITTED	APPROVED
ARI	644	266
LECP	76	20
COSSI	9	8
CR&EI	217	17
OTHER	N/A	31
TOTAL	**946**	**342**

In FY98 and FY99, NAVAIR invested more than $67 million in affordable readiness initiatives with an expected cost avoidance of more than $1 billion by FY09–a return of nearly 9.9 to one over 10 years. In FY00, NAVAIR invested an additional $44 million in initiatives with a projected additional $756 million in cost avoidance by FY09–a return of more than 12 to 1 on the FY00 investment. For initiatives approved in FY98 and FY99, more than 68 percent of the projected cost avoidances will be in non-NAVAIR budget accounts.

Critical to the success of any reduction effort is the ability to measure progress. In 1999, NAVAIR

Projected Cost Avoidance Breakout



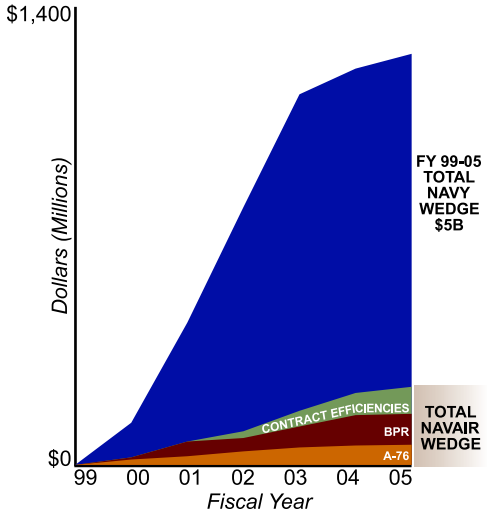
developed and fielded the Affordable Readiness Tracking System (ARTS) in order to provide a structured and automated approach for reviewing and tracking these initiatives. Additionally, NAVAIR plans on using ARTS to document and track TOC baselines, as well as individual TOC initiatives and their impact on the TOC baselines. ARTS is currently being modified/enhanced to collect the TOC elements (over and above the operations and support elements contained in affordable readiness) and this enhancement will be completed in the second quarter of FY00.

LIQUIDATING THE NAVY BUDGET WEDGE

During 1999, the Naval Air Systems Command (NAVAIR) was a leading participant in the development of the Navy's three-pronged strategy to recover a $5 billion outsourcing budget shortfall. The Navy's objective is to achieve the necessary savings by reducing the total cost of doing business, while maintaining the level of support provided to fleet customers. The shortfall, commonly referred to as the Navy "Budget Wedge", spans FY00–05. The Navy plan incorporates Business Process Reengineering (BPR), contract efficiencies, and commercial activity studies in combination to recover the Wedge, thus replacing the earlier strategy of relying solely on commercial activities.

BPR and contract efficiencies are the preferred approach for liquidating the Wedge, because they focus on reducing the total cost of doing business, rather than only labor costs. BPR and contract efficiencies also reduce the impact on our employees; protect the core capabilities NAVAIR must retain in order to effectively support its warfighting customers; and reengineer our processes for cost and cycle time efficiencies. Nearly 29 percent of NAVAIR's wedge commitment will be achieved through commercial activity studies, while BPR and contract efficiencies will account for 42 and 29 percent respectively.

LIQUIDATING THE WEDGE



COMMERCIAL ACTIVITY STUDIES

NAVAIR is conducting commercial activity cost studies consistent with the direction of the Office of Management and Budget Circular A-76. The studies are competitions between the government and private sector to determine who can perform the work more efficiently.

During 1999, the Naval Aviation Systems Team completed 19 commercial activity studies that were initiated in 1997 and 1998; the government won 16, and contractors won 3 of the studies in the areas of test and evaluation management, shore station management, automated data processing, and administrative support. The total cost of the more than 1,100 positions involved in these studies is expected to be reduced by 30 percent, which is the average savings rate for commercial activity studies. Five studies initiated in this same time period are still in progress.

In 1999, NAVAIR initiated 21 studies affecting 1,138 positions in areas such as administrative support, material management, and child care. The average study process time, from start to award, is 18 to 27 months. These studies include all sites, business units, and competencies.

BUSINESS PROCESS REENGINEERING

The reengineering of our business processes began in 1997 in an effort to achieve significant cost and cycle time reductions for the Fleet. Because BPR addresses the total cost of doing business, it soon became the preferred approach for liquidating NAVAIR's portion of the Navy outsourcing "Budget Wedge", reducing the Command's reliance on commercial activity studies to produce the savings. BPR now accounts for the highest percentage of Wedge liquidation plan savings—42 percent.

In July 1999, 13 teams began implementing more than 80 process improvement initiatives. While implementation schedules vary by team, most teams will complete their work by the end of 2001. Front-runners in achieving these results are Engineering Investigations, Naval Aviation Depot Material Management, and Asset and Property Management.

CONTRACT EFFICIENCIES

During 1999, 83 percent of our $18.4 billion budget was managed through contracts with private industry. We recognize that this is a significant area of opportunity to help meet the wedge commitment. Contract efficiencies are being pursued internally, as well as with our

NAVAL AIR SYSTEMS COMMAND VICE COMMANDER, RADM CRAIG STEIDLE, BRIEFS SUPERVISORS AND MANAGERS AT NADEP JACKSONVILLE ON THE NECESSITY OF IMPLEMENTING BUSINESS PROCESS REENGINEERING THROUGHOUT THE NAVAIR COMMUNITY (JUNE 1999)

industry partners, the Naval Inventory Control Point in Philadelphia, PA, and the Defense Supply Center in Richmond, VA.

Initiatives underway include: consolidating contracts for similar requirements across sites, competencies, and programs; reducing infrastructure and other indirect costs associated with our prime and sub-contractors; incentivizing contractors to focus on the best overall price; and pursuing multi-year contracts where appropriate to realize savings from long-term contractual relationships.

PROCESSES

Increased demands on our operating forces and the reduced availability of funds to sustain required readiness have heightened the Naval Aviation Systems Team's (TEAM) focus on reducing cost and cycle time, while maintaining the quality of products and services. Recognizing this, our goal is to become a process-centered organization, where people are focused on customers, performing processes smarter and faster, and are better able to understand their contribution to the end product.

Over the past two years, we've made great strides toward meeting this goal. The effort began in 1997 with a comprehensive study of costs associated with business processes across sites and competencies. This data aided TEAM leadership in identifying areas for improvement from within the organization's six major processes (Acquisition Management; Test and Evaluation; Repair and Modification; In-Service Engineering and Logistics; Technology Development and Organic Development; and Support Services). In 1998, 14 teams were chartered to redesign their respective processes to achieve dramatic savings and cycle time reductions, while maintaining the quality of products and services.

In July 1999, business process reengineering teams began implementing more than 80 redesign recommendations to improve the way we do business. While the benefits of most efforts won't be realized until 2000 and 2001, at year's end, many teams showed significant progress toward improving service and lowering costs for the Fleet.

ENGINEERING INVESTIGATIONS

One of the most visible process improvements to the Fleet will be the newly revamped Engineering Investigations (EI) process. This BPR team completed a successful demonstration of the new process with 22 Navy and Marine Corps squadrons and 10 Aircraft Intermediate Maintenance Departments in November and December of 1999.

The demonstration validated the reengineered EI process, which is expected to reduce EI processing time from 180 to 30 days from initial receipt of exhibit, and cut exhibit shipping time from 31 days to 3 days within the continental U.S. and 7 days outside the continental U.S.

PRIOR TO THE BUSINESS PROCESS REENGINEERING ROADSHOW BRIEFING AT NADEP CHERRY POINT, RADM CRAIG STEIDLE TALKED WITH PEOPLE (JUNE 1999)

Demonstration participants were very enthusiastic about the potential time savings and convenience of submitting and tracking EIs through a web site *https://ei.navair.navy.mil*. They were also impressed with the ability to express ship exhibits through companies such as *FedEx*. Fleet units participating in the demonstration all remarked that the new system would greatly reduce processing time. An EI is "triggered" when the Fleet experiences a premature or unusual system failure.

The BPR team will enhance the web site and accompanying tools based on feedback received during the 1999 demonstration and a more comprehensive demonstration in April 2000, before deploying the new process to all squadrons in October 2000.

NAVAL AVIATION DEPOT MATERIAL MANAGEMENT

The Naval Aviation Depots are beginning to see the results of improvements made to the process of procuring parts for repairing aircraft. From July to December 1999, the depots accrued more than $2 million in savings through the use of credit cards for material purchases. Credit card purchases require significantly less paperwork, freeing up personnel for other tasks. Credit card use also speeds up the parts requisitioning process, contributing to improved product turnaround time.

On-line purchasing is further reducing material purchasing costs. The Defense Logistics Agency (DLA), an organization that procures, manages, stores and distributes much of the depot parts inventory, currently has 541 items listed on their E-Mall web site available for on-line purchase. To date, DLA charges approximately 20 percent less for parts purchased on-line. The depots are beginning to accrue savings through the use of this site and expect savings to increase exponentially once more items become available. The depots are working with DLA to further populate the site with frequently used production line parts.

COMPONENT RELIABILITY ANALYSIS

The depots are also beginning to analyze results from their study of "bad actor" components in order to identify reliability improvement opportunities for parts that are frequently failing in the field.

An engineering team at the Cherry Point, NC, depot completed the first component reliability analysis on a part of the AV-8B *Harrier's* flight control system. The team recommended using a better designed part and different handling and testing procedures to make the part more reliable, which resulted in 43 percent fewer aircraft removals. For the Fleet, this translates into potential savings of 400 labor hours, 40 test flights per year, and a cost avoidance of nearly $260,000 in annual repair costs.

NAVAL AVIATION DEPOTS REORGANIZE WORKSPACES

The depots have also organized workspaces and employees into units focused on product lines to reduce production turnaround time and costs.

At the North Island, CA, depot, this reorganization has been an opportunity for the Hydraulics Branch to modernize operations. The depot recently consolidated much of its hydraulic workload.

MEMBERS FROM NADEP NORTH ISLAND'S F/A-18 HORNET PROGRAM SHOPS AND SUPPORT ORGANIZATIONS WITH THREE AIRCRAFT READY FOR FINAL ACCEPTANCE TO FLEET CUSTOMERS (NOVEMBER 1999)

Previously, workload was spread between two buildings, causing components to be handed off to different areas more than 100 times and travel more than 900 miles per quarter.

During the consolidation, depot members excessed or scrapped more than 40 pieces of large, antiquated equipment, such as lathes and grinders, and are taking better advantage of machines that can accomplish various tasks. Once the reorganization is fully completed next year, it is expected that the hand-offs and miles traveled will be reduced by 60 to 75 percent, greatly reducing product turnaround time.

ASSET AND PROPERTY MANAGEMENT

Each of the Command's eight sites is implementing initiatives to reduce infrastructure maintenance costs, freeing up dollars to meet the Navy "Wedge" and Fleet modernization needs.

The Naval Air Station at Patuxent River, MD, used performance-based specifications in developing its most recent base operating support contract. As a result, the 1999 contract award was 18 to 33 percent less expensive than the previous contract, saving millions of dollars over the next five years. Base operating support contracts cover services such as custodial services, hazardous waste removal, and utilities operations.

Additionally, the Naval Air Weapons Station at China Lake, CA, began demolishing 98 excess buildings, eliminating 279,993 square feet of costly, outdated structures. Patuxent River began demolishing five buildings, reducing the infrastructure by 40,518 square feet. The Naval Facilities Engineering Command is funding all of the demolition activity at both sites. Building demolition will be completed by 2001 and is expected to save millions of dollars by eliminating the need for repairs, building code updates, and security and fire protection.

ENTERPRISE RESOURCE PLANNING

As the final step toward becoming a process-centered organization, the Naval Aviation Systems Team (TEAM) is actively participating in the Navy's pilot efforts to demonstrate the functionality of off-the-shelf business operations software known as Enterprise Resource Planning (ERP). The software itself is of lesser significance than the process reengineering it will support. ERP implementation will intensify the Command's process improvements by reengineering, automating, and integrating the majority of business processes. When complete, ERP will enable the efficient sharing and re-use of data, information, and business practices across the TEAM–providing timely, accurate information to support effective decision making.

The Naval Air Systems Command (NAVAIR) is leading the pilot to demonstrate automated program management functionality and processes; and in partnership with the Naval Supply Systems Command, co-leads the pilot for streamlining aviation ordering, inventory, maintenance, and repair management functions. NAVAIR established the Enterprise Solutions Program Office in June 1999 to lead the TEAM's reengineering efforts, including the coordination of ERP implementation with other Department of the Navy pilot efforts. An ERP system and integrator will be selected in February 2000; and the program management pilot will be demonstrated in late 2000 using E-2C aircraft program data. Based on the pilot results, Navy leadership will determine whether to implement the ERP solution Navy-wide or on a selective basis starting in FY01.

CONTINUAL PROCESS IMPROVEMENT

NAVAIR plans to monitor the performance of its key processes on a regular, enterprise-wide basis to ensure anticipated savings and cycle time reductions are realized and to adjust processes in response to changes in technology and customer needs.

These process improvements are a significant step toward becoming a process-centered organization. NAVAIR is committed to continually refining processes in support of the warfighting customer.

Financial Overview

MACRO FUNDING FLOW

The Naval Aviation Systems Team (TEAM) operates in a collaborative partnership with private industry to provide our fleet customers with quality warfighting systems. During FY99, private industry received 83 percent of the TEAM's total funding ($18.4 billion) in support of providing products and services for the Warfighter.

To continue being the provider of choice among the Department of Defense and others for naval aviation products and services, we continually review our operations to ensure that we are performing our mission in the most cost efficient and timely manner. Over the past few years, we have recognized the need to look beyond work force and infrastructure reductions and focus on reducing the cost and cycle time of our products and services.

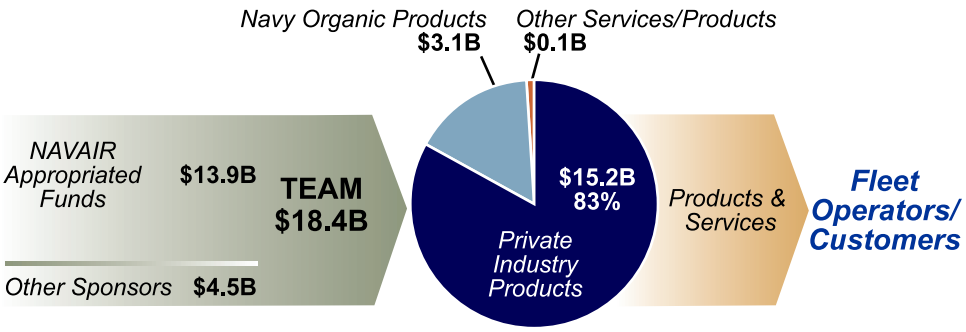
In 1999, the TEAM began implementing more than 80 Business Process Reengineering (BPR) initiatives to ensure the most efficient and cost effective business practices are in place. Savings achieved through these efforts will be applied to the Naval Air Systems Command's (NAVAIR) portion of the Navy's $5 billion outsourcing shortfall, referred to as the "Budget Wedge" *(See page 60 for more information on BPR initiatives).*

During 1999, the TEAM became part of a Navy pilot program and began planning to implement an Enterprise Resource Planning (ERP) system. This system will support BPR improvements by automating and integrating the majority of NAVAIR business processes and will enable significant financial management process improvements. The ERP system will support timely and cost effective business decisions by providing access to accurate and real-time information *(See page 63 for more information on ERP implementation)*.

While BPR and ERP initiatives are focused on reducing costs associated with the TEAM's organic products and services ($3.1 billion in FY99), the TEAM is also implementing procedures to provide industry with incentives to reduce their costs through innovation and process improvements. This is critical since the majority of the TEAM's funding is funneled to private industry ($15.2 billion in FY99) *(See page 61 for more information on contract efficiencies).*

Macro Funding Flow

figure 1



The TEAM's total funding in FY99 was $18.4 billion; $13.9 billion were NAVAIR appropriated funds *(figures 1 & 2)*. The Deputy Chief of Naval Operations for Air Warfare (N88) is the largest sponsor of this direct funding, providing 87 percent of the appropriated funds. The remaining $4.5 billion comes from other Navy (e.g., Naval Sea Systems Command), as well as non-Navy organizations (e.g., Air Force, Army, Foreign Military Sales). In support of naval aviation, the Naval Inventory Control Point in Philadelphia, PA, contributed $0.6 billion for component and manufacturing at the naval aviation depots.

The TEAM spent $3.1 billion on organic products and services. Since the TEAM collaborates with other services on a variety of programs, the remaining $0.1 billion of the $18.4 billion in total funding was allocated to other services, agencies, and systems commands.

The proportional share of funds going to private industry has increased over the past six years from 69 percent in FY93 to 83 percent in FY99 *(figure 3)*.

In FY99, NAVAIR's appropriated funding increased by 15 percent, while funding from other Navy and non-Navy customers remained the same. NAVAIR appropriated funds increased from FY98 due to additional procurement in aircraft and weapons, specifically the F/A-18E/F, CH-60, and *Tomahawk* missiles *(figure 4)*. Appropriated funds consist of the following: Aircraft Procurement, Navy; Weapons Procurement, Navy; Research, Development, Test and Evaluation, Navy: Operations and Maintenance, Navy/Navy Reserve; Other Procurement, Navy; and other funds (Procurement of Ammunition, Navy and Marine Corps, and Base Realignment and Closure commission actions) *(figure 5)*.

Overall, the TEAM has experienced a 35 percent reduction in appropriated funds since 1990, the largest of which occurred in the weapons procurement account. In the last 10 years, this account has been reduced by 57 percent (constant FY99 dollars).

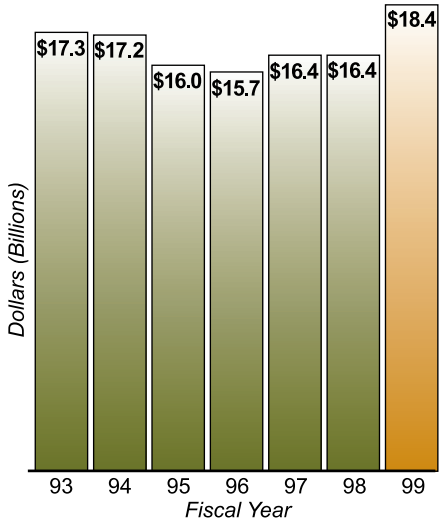
OPERATING EFFICIENCY

NET OPERATING RESULTS

The Naval Aviation Systems Team (TEAM) operates the Naval Aviation Depot and Naval Air Warfare Center Working Capital Fund at a net-zero level. Workload fluctuations are expected to result in minor surpluses or losses from year to year. Customer rates in the outyears will decrease based on positive variances and increase based on negative variances. The TEAM adjusts rates for services accordingly to bring the fund back to a net-zero state. During FY99, the warfare centers' Net Operating Result year-end target was achieved. The depots operated within one percent of their planned activity level.

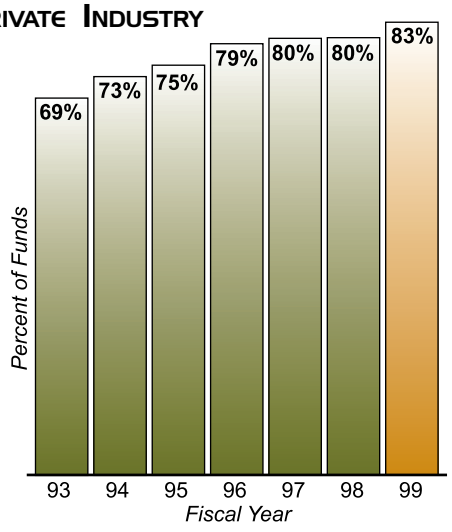
TEAM FUNDING (ALL SOURCES)

figure 2



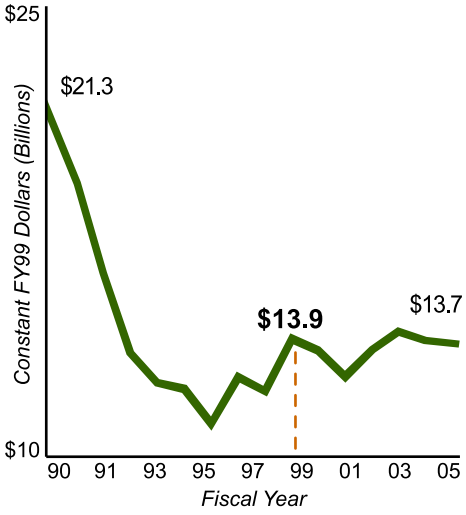
PERCENT OF FUNDS TO PRIVATE INDUSTRY

figure 3



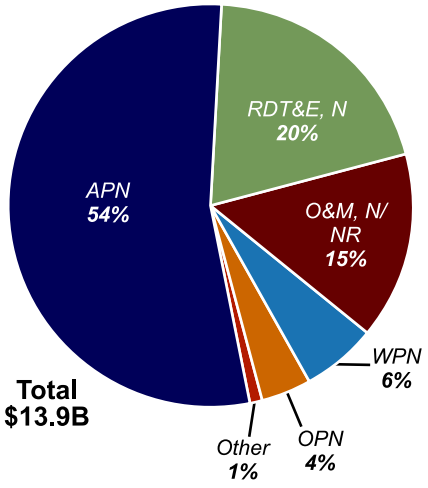
NAVAIR APPROPRIATED FUNDS (TRENDS)

figure 4



FY99 NAVAIR
Appropriated Funds

figure 5



Overhead Cost Trends

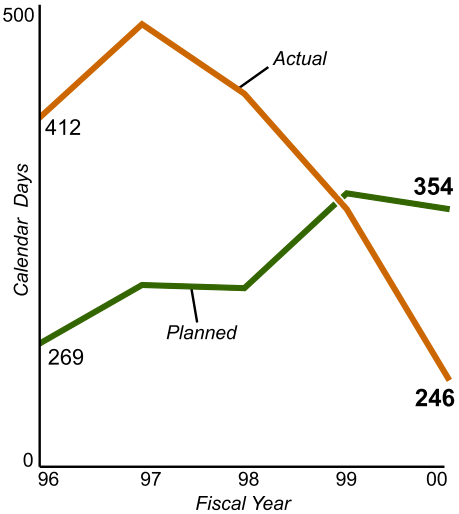
figure 6

	Fiscal Year		
PRODUCT CENTERS	**91**	**98**	**99**
Overhead Cost	**$934**	**$619**	**$600**
Ratio of Overhead to Total Cost	**33%**	**30%**	**29%**
FY91-FY99 Total Cost Reductions	**36%**		
NAVAL AVIATION DEPOTS			
Overhead Cost	**$896**	**$540**	**$559**
Ratio of Overhead to Total Cost	**37%**	**35%**	**35%**
FY91-FY99 Total Cost Reductions	**38%**		

Constant FY99 Dollars (Thousands)

EA-6B SDLM
Turnaround Time

figure 7



OVERHEAD

There have been significant reductions in overhead at the depots and warfare centers. From FY91 to FY97, the majority of this reduction was due to the closing and consolidation of sites as part of the Base Realignment and Closure commission actions. In FY99, the TEAM began to realize savings as a result of several Business Process Reengineering (BPR) initiatives and Commercial Activity (CA) studies conducted at the warfare centers. Through BPR and CA studies, further reductions in overhead over the next several years are also expected at the depots *(figure 6)*.

MEASURING TURNAROUND TIME

One method to measure financial results is through turnaround time. The Standard Depot-Level Maintenance (SDLM) turnaround time for the EA-6B aircraft has seen a 31 percent reduction since FY96 *(figure 7)*. A variety of process improvements were developed for the EA-6B SDLM process, allowing more flexibility and responsiveness in order to meet the significant variations in work content requirements which are inherent to the SDLM environment.

WORKLOAD / WORK FORCE TRENDS

The Department of Defense's shift in strategy following the end of the Cold War led to a substantial reduction in the work force and a decrease in military spending. Since 1990, there has been a 25 percent workload reduction at the depots and a 12 percent reduction in workload at the warfare centers. The reduction in work force (50 percent at the depots and 54 percent at the warfare centers) has occurred more rapidly than reductions in workload. These trends are now stabilizing with the end of Base Realignment and Closure consolidations. We will continue to sustain a work force capable of performing our critical core capabilities *(figures 8 and 9)*.

OUR FINANCIAL FUTURE

In October 1999, the Naval Aviation Systems Team (TEAM) finalized its Strategic Plan. The top level goals are Warfighter, People, Affordability, and Processes. The TEAM is committed to supporting the Warfighter by developing high-quality, interoperable systems for the future—producing them faster and for less money. The Affordability and Processes goals focus on reducing the overall cost and cycle time of products and services to the Fleet. Specific strategies have been identified to implement financial management improvements and design Total Ownership Cost (TOC) decision-making processes to enable the TEAM to execute TOC reduction plans, as well as identify operating efficiencies that reduce internal costs. The TEAM will reduce TOC through improvements in core internal processes and is taking steps to provide industry with incentives to reduce costs.

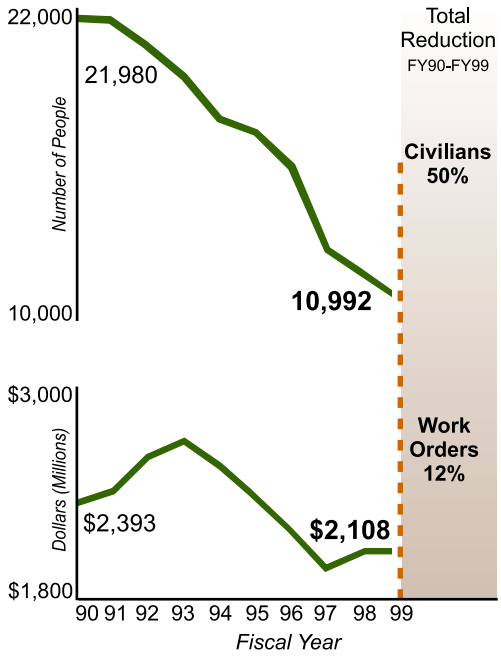
To help liquidate the Navy "Budget Wedge", the TEAM plans to reduce its total cost of doing business. Objectives include identifying targets for achieving cost savings/avoidances over the next five years through business process reengineering, commercial activities studies and contract efficiencies.

The TEAM selected the Balanced Scorecard as its performance measurement tool in implementing the strategic plan. Leadership will review the top-level metrics for each of the four goals, as well as key actions necessary to obtain the desired results on a quarterly basis. This review will enable leadership to accurately gauge the success of each goal and, ultimately, the success of achieving the TEAM's vision. The measures will provide a macro view of performance trends, enabling management decisions that promote continued cost reduction and readiness improvements.

The TEAM remains committed to executing a revolution in business affairs—resulting in more product for the dollar for our fleet customers. However, our paramount obligation is improving Warfighter effectiveness and satisfaction through increased readiness and improvements in fleet support. We will continue to fight for the resources necessary to fulfill this obligation. The men and women of our Navy deserve nothing less.

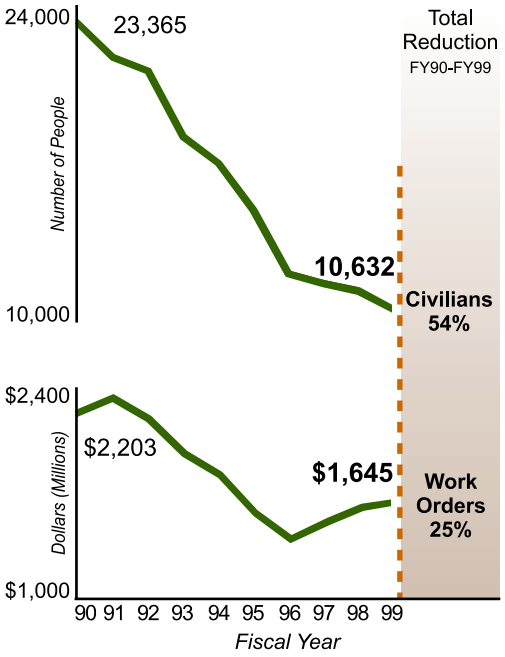
Product Centers
Customer Orders and Work Force

figure 8



Naval Aviation Depots
Customer Orders and Work Force

figure 9



TEAM Awards

The Naval Aviation Systems Team (TEAM) continued to garner awards for superior achievement in many areas. The Naval Air Systems Command's (NAVAIR) Human Resources Office received the 1999 Nathaniel Stinson Leadership and Achievement Award. The Nathaniel Stinson Equal Employment Opportunity Award honors outstanding commands and activities that have distinguished themselves and made notable contributions in the areas of affirmative employment, human rights, equal opportunity, and human resources.

NAVAIR also received a 1999 Ethics Program Award for outstanding achievement in developing and managing its ethics program, which is managed by NAVAIR's Office of Counsel. The Office of Government Ethics determined that NAVAIR has an exceptional and well-managed ethics program, giving special recognition to NAVAIR's computer-based tracking system used for financial disclosure statements and annual ethics briefings. The Office of Government Ethics highly recommended that NAVAIR share its expertise in managing its ethics program, in particular the computer-based tracking system for the financial disclosure statements with other Navy commands.

Several program offices received recognition from the Department of Defense (DoD) for their efforts in acquisition reform. Following a critical design review in September, the AAR-47 sensor upgrade program received the Service Acquisition Executive Acquisition Reform Certificate of Excellence and the Vice President's Hammer Award for the implementation of several initiatives. This upgrade program will save significant weight and space on aircraft and will reduce cycle time from development to fielding by 24 months. The expected cost savings and cost avoidance over the life of the program is expected to be $240 million.

The F-14B upgrade integrated product team (IPT) received the Defense Acquisition Executive Certificate of Achievement for innovations in acquisition. The F/A-18 Advanced Tactical Forward Looking Infrared

ABS GROUP PRESIDENT CHRISTOPHER J. WIERNICKI OF HOUSTON, TX, PRESENTS NADEP CHERRY POINT COMMANDING OFFICER, COL ROBERT LEAVITT THE INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) 9002 REGISTRATION (NOVEMBER 1999)

JOHN CONNER III AND PHIL HORNE OF NADEP CHERRY POINT GO THROUGH PROCEDURES FOR CLEANING AND CONTAINING A SIMULATED CHEMICAL LEAK; THE FACILITY RECENTLY WON THE CNO'S ENVIRONMENTAL QUALITY AWARD

IPT earned the Service Acquisition Executive Certificate of Excellence Award. The Joint Standoff Weapon (JSOW) program also received the Defense Acquisition Executive Certificate of Excellence Award. Additionally, the Daedalians Organization awarded the JSOW its coveted weapons systems Daedalian Award.

The Department of Defense also recognized the TEAM's excellence in the area of research, development, test, and evaluation, awarding the Defense Acquisition Executive Certificate of Achievement for Excellence in Acquisition Reform to the V-22 Osprey program. A cadre of V-22 pilots who have pioneered the developmental test program for the revolutionary V-22 tilt rotor aircraft, received the Frederick L. Feinberg Award. The Osprey program office also earned the annual DoD Value Engineering Achievement award for "aggressively pursuing ways to reduce acquisition and life cycle costs."

The Naval Air Warfare Center's (NAWC) research and engineering department in Orlando, FL, won an Acquisition Reform Certificate of Excellence for in-service engineering. Orlando was recognized for streamlining the standard modification process (response and action procedure) for evaluating and implementing proposed design and engineering changes to existing warfare trainer/training systems. The new process realized significant cost avoidances, reducing maintenance costs, cycle time, and improving readiness.

For its contribution in the research and development of training systems, the NAWC earned the Vice President's Hammer Award for its Office of Training Technology, Seamless Product Information, and Data Exchange and Repository. The EA-6B Weapon System Trainer integrated product team received a Department of the Navy Competition and Procurement Excellence Award.

In March, the Chief of Naval Operations awarded the Naval Aviation Depot at Cherry Point, NC, the FY98 Environmental Quality Award in the Industrial Installation Category. Accomplishments leading to the award included recycling 5,254 tons of metal, paper and cardboard, as well as a 60 percent reduction in hazardous waste disposal. Additionally, the depot tied as runner-up for the Secretary of the Navy's FY98 Environmental Quality Award in the industrial installation category. The depot's environmental efforts also earned the Navy's Community Service Flagship Award for environmental stewardship in 1999. In addition, the Naval Aviation Depot at North Island, CA, received both the Command and the Chief of Naval Operations Aviation Safety Awards for 1998.

The Naval Aviation Systems Team . . .

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